THE
ELECTRICAL REVIEW

Volume CXXVII. No. 3268

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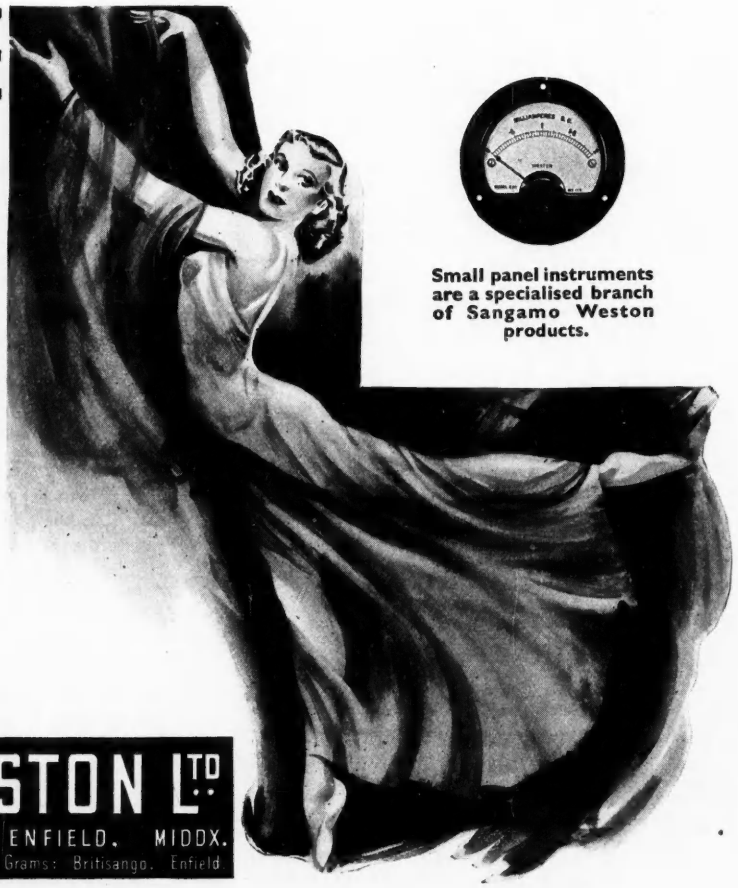

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Factory Installation Practice

Influence of Wartime Conditions

FOR the second time in the history of this country manufacturing is now so intense as to render the consequent factory electrical installation work practically devoid of any relationship to normal requirements. As in the years immediately after 1918 there will be again both good and bad repercussions electrically. For this reason and because of the vital need of the moment to speed up war production it is a great pity that present restrictions have prevented us from making a fuller investigation of this subject, conclusions from which form a separate article in this issue, and thus making a greater contribution to the war effort.

We have not, however, confined ourselves entirely to war production, and so far as possible we have tried to keep an eye on general industrial installation development, endeavouring, with some speculation, to indicate the probable influence of pre-war conditions and to-day's intensity on normal practice. Since the last war we have seen a period of fierce competition in the contracting world with results far from encouraging; indeed we know of contractors who have earned a reputation for high-class work, but have ceased to cater for factory installations rather than lower their work to a standard which they have visualised as demanded by modern conditions.

Capital Cost

But what are the adverse influences? Electrical contracting is certainly no exception to the commercial trend of the century, and it must be assumed that capital cost is always a deterrent to attaining the ideal; all the same it is a thing over which the reputable contractor can have more control than he sometimes imagines. We agree that it is strange to see manufacturers of high-class goods apparently satisfied with low-class electrical installations. These manufacturers, however, produce high-class goods mainly because they have been convinced that it is good business to do so, and every contractor who believes in his own work should be able to convince the sensible manufacturer about his electrical installation by the same argument.

The electrical contracting industry will do itself a good turn when it stops preaching that capital cost should be a secondary consideration. It should not. It is and must remain essentially of primary importance and only in this way will the advisability of frequently paying " big money " be appreciated. It is equally important for the contractor to appreciate, and make his client appreciate, that the most costly scheme is not necessarily the most efficient one.

The second alleged main adverse influence is " wiring systems." Is it really true that the " systems " are responsible for many of the bad conditions of to-day, or is it not more to the point to lay stress on the contractor's attitude to the systems? One hears of systems that are " put together like a Meccano outfit," and of the actual installation work being made so easy as to permit of its being done by a youth without experience and ignorant of the essentials. Employment of such labour to undertake responsibility is more than a fault on the part of the contractor, and no reputable contractor will do it. It is the contractors' business to decide whether the use of " systems " is right or wrong and to prove their contention. If they still have not the machinery to do so, then their house is still not in order.

Craftsmanship in Design

May we suggest a different outlook for contractors who cannot see eye to eye with the advocates of the " systems " ? Is the development of the " system " not a case of transferring some of the craftsmanship from actual production (erection) to the design stage, as is the trend in so very many instances nowadays in the manufacturing field? We are not attempting to make out a case for wiring systems; in fact we confess to a leaning towards the " good old screwed barrel and armoured cable " by bias of training, but our contention is that whatever scheme is adopted and method employed the result will be satisfactory if sound engineering principles are observed. It is always well to remember that a poor installation does not necessarily imply non-compliance with the Regulations.

It is hardly possible to over-rate the importance of planning for any factory installation, and in this connection the vital necessity of early co-operation with the architect must be stressed. What architect would draw up his final plans for a theatre without knowing the electrical requirements? Are factory electrical requirements less important? There will never be really efficient designing until genuine co-

operation with the architect is attained, and on that depends acceptance by the contractor of responsibility to secure such co-operation. An outlook which visualises the electrical scheme as part of the factory and not merely an adjunct is essential. Justification for this statement is the very frequent loss of time—a particularly serious aspect at the moment—involved by detailed structural alterations because the plans do not provide for the electrical requirements.

Hams Hall

JUDGING from the large additional expenditure on Hams Hall "B," which has been approved by the Birmingham City Council, the capital cost per kW installed is likely to be much more than the £15.33 incurred for the "A" station. This will unfortunately offset, no doubt, much of the commercial advantage of the technical improvements in its design. Under independent operation it would have been in service over two years, Sir Percival Bower states, but the existence of the grid made its construction unnecessary then. In the meantime, however, manufacturing costs have advanced, and a new interpretation has been given to Section 13 of the 1926 Act, which provides that the cost of electricity to the owners of a selected station shall be no more than it would have been if there had been no grid. The C.E.B., as reported in this issue, has applied the principle in this case to extra expenditure due to the war.

Unarmoured Cables

ANY action that makes for economy in the use of materials, without adversely affecting the reliability of so essential a factor in munitions production as electricity supply, is to be welcomed. The laying of lead-sheathed cables without armouring (subject to the adoption of other mechanical protection) has previously been approved by the Electricity Commissioners in several special instances with good results. What has hitherto been an exception has now become the rule, as in future approval will not generally be given to the use of steel armouring. Further economies can be effected by rigid adherence to B.S.S. 480, abandoning a preference for the obsolete and more conservative B.S.S. 7. While B.S.S. 480 is not all that it might be—it could with advantage be modified on the lines suggested by Mr. S. W. Melsom in our issue of June 7th—for present purposes it holds the field and should be worked to. It is a new thing for the Commissioners to specify maximum instead of minimum requirements, but they have now modified Electricity Supply Regulation No. 12 so that cable standards are required to be not in excess of (instead of "not lower than") that prescribed in the current B.S.S.—odd, but in the circumstances, and having regard to the reputation for good work of our cable manufacturers, quite justifiable.

Contractors and the War

ONE of the disappointments occasioned by the war has been the cancellation of the annual conference of the Electrical Contractors' Association. This was not merely an enjoyable social function, but one of the two yearly opportunities (the other being the also-cancelled annual dinner) for the members to get to know one another. In a rather loosely linked organisation like the E.C.A. it consequently served an important purpose. A year or so ago a scheme designed to widen interest in the Association's activities was put into operation; the number of Sectional Boards was raised from six to eleven, and the number of members elected by the branches was increased so that a much greater proportion of the membership was given an active share in the management of the Association's affairs. It was also arranged that each Board should hold at least once a year regional conferences which the President and Director would attend. Unfortunately, the war has interfered with the holding of these conferences, and in his annual report, which is dealt with in this issue, the President (Mr. Walter Riggs) stated that the whole scheme for the decentralisation of the Association's activities had received a severe setback. He was hopeful, however, that when the time was ripe the resumption of the regional conferences would be immensely valuable.

Wages and Conditions

AMONG other matters touched upon by Mr. Riggs in his report was the Code of National Working Rules which has been evolved for the contracting industry and is to be put into operation in October. A glance through the current E.C.A. Year Book will convince the reader that such a code was sadly needed. The weekly war addition to wages was also mentioned. Some members have not taken kindly to this, but Mr. Riggs said that in any consideration of the matter the Council's one concern was to secure the best possible labour operation for the successful prosecution of the war. He also foreshadowed the issue of an Order compelling all employers, whether federated or not, to observe the recognised rules of the industries in which they operate. We think that Mr. Riggs was right in suggesting that if this was found necessary in wartime it was also desirable afterwards; the competition of employers who recognised no obligations to any but themselves has long been a bugbear of E.C.A. members, and it is not confined to the electrical contracting industry.

Salvage Collection

IT is essential that householders shall have impressed on them the urgent need for saving their paper, bones, scrap metal and other raw materials for collection by their local authorities. Mr. H. C. Judd, the Controller of Salvage to the Ministry of Supply, suggests that those authorities might overprint their rate demands with a reminder of the importance of this matter and that electricity supply undertakings, who are in very close touch with the country's housewives might include similar appeals with their accounts. We recommend the suggestion to supply authorities for their willing compliance. An even more fruitful field for the salvage organisation is represented by the stores and yards of engineering firms. As Mr. H. E. Crawfurd points out in a letter in this issue, most maintenance engineers hoard all kinds of old machinery parts and odds and ends of iron and steel in case they may come in useful some day. That day has come, and they should arrange for collection at once.

The G.E.C. Report

THE ramifications of the General Electric Co., Ltd., are world-wide, and its activities are therefore of more than domestic interest, for its trading results are indicative of the general trend of the electrical industry in this country. It is true, as the annual report for the year ended March 31st just published states, that the company has been largely engaged on Government work, but the organisation is such that it has been able to pursue its policy of maintaining and developing its export business, which, in spite of difficulties, was only slightly below that of last year's record figure. It will be recalled that immediately on the outbreak of war the company put into operation an export and distribution plan, the fruits of which are shown in the excellent accounts now presented.

Air-raid Effects

IN view of the widespread damage to mains and the consequent dislocation of supplies which electricity undertakings are now prepared to meet as a result of air raids, it is somewhat comforting to learn how local was the damage caused in a recent raid when eight houses were almost completely demolished by a bomb. All the meters, switches, fuse boxes, &c., in the premises had completely disappeared and had not been recovered days after. In one house the main service cut-outs had been blown away leaving the cables sticking up, still alive. Despite this damage, the supply to none of the other houses in the road was affected. Another interesting fact is that in one of the demolished houses almost the only thing remaining standing was the electric cooker, and this did not seem even to be scratched.

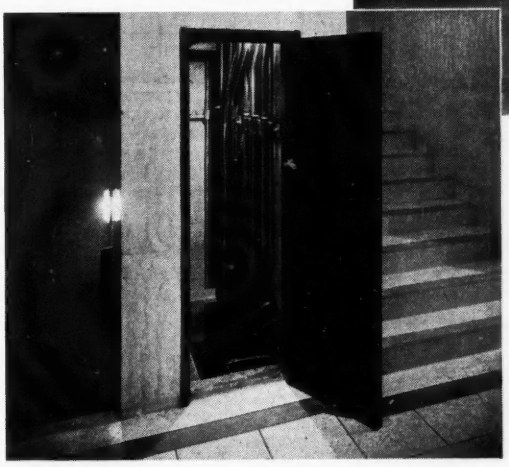
FACTORY DISTRIBUTION

Critical Survey of Electrical Installation Practice

THE ELECTRICAL REVIEW has already recommended that contractors should foster the outlook of the supply distribution engineer when planning factory installations. What responsible mains engineer would draw up a distribution scheme which was not governed by load diversity considerations? After all, the same fundamental engineering principles apply to both town and factory distribution—plan to reduce the lengths of sub-circuits to the smallest limits and load up the main feeders. In these days of large factories with e.h.v. supplies, substations and underground networks such advice may at first seem redundant, but visit, as we do, some scores of factories in the course of a year and then decide. Of course, factories and their conditions are so varied that it is quite impossible to lay down any hard-and-fast rules, and we strongly deprecate the growing tendency in some quarters to try to do so.

The days of pioneering for the electrical contractor are far from over and every installation must be dealt with individually, reasonable scope being given to the ingenuity of the particular contractor or consulting engineer concerned. Today it is becoming almost commonplace to see a factory in which several hundred machines in one department have to be served by an installation which provides for their later removal to another department, and for their replacement by, say, a few larger machines; or another factory where perhaps a 1,000-HP motor on a group drive is centred among many small individual drives. Careful planning carries advantages to both the manufacturer and his contractor and involves keeping faithful records of the installation. The customer is relieved of anxiety about future extensions and the contractor is often assured of further business because he comes to be regarded as the authority on the installation.

The supply arrangements for any factory must, of course, influence the planning of the installation, but we do not propose to deal fully with this aspect now, partly because the importance of the subject demands a separate article and partly because the work is usually in the hands of the supply, resident or consulting engineer, with whom co-operation is vitally necessary. In one respect, however, the supply arrangements concern the contractor particularly. It is too often assumed that the point of supply intake is the proper place for the factory distribution centre and this often leads to an uneconomical distribution scheme. Frequently the choice of the point of supply intake (sometimes purely "geographical") takes no account of the factory load centres or even the building lay-out.

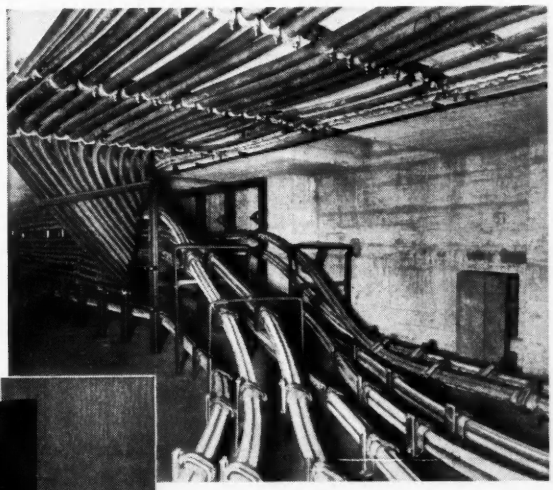


An excellent example of good work in co-operation with the architect is the central riser duct up the factory staircase

The question of establishing the distribution centre in a more convenient part of the factory and employing trunk-main transmission is thus worth a good deal of thought. Compromise, if governed by ingenuity, is often a good thing in this respect. Generally the possible provision of ring mains should receive much more attention, particularly where there is more than one supply intake, and we hope and believe that recent developments in this connection arising out of A.R.P. considerations will lead to a greater attention to the subject from the point of view of supply security and economy. We think the tendency in some quarters to visualise two substations with suitable interconnection, each capable of supplying two-thirds of the installation load, is sound in principle.

Without attempting to deal with lighting and power problems as such it is well to consider their influence on factory wiring, and in the lighting field no doubt the growing use of discharge lighting heads the list. We know of difficulties that have occurred because the contractor has apparently considered only the running load of discharge lamps, with consequent overloading at starting and volt-drop preventing striking. The advisability of alternating lamps on different phases to obviate stroboscopic effects introduces what has been regarded as undesirable with ordinary lighting—three-phase lighting in one area. We believe that this has no very marked effect on cost. We would not encourage tendencies to complicate switching where it is not recommended by the lighting expert, although in the textile industries, in particular, we have been impressed by branch switching instead of elaborate pilot systems. It is interesting from those advocates of lower-voltage m.f. lighting, on the score of greater efficiency and strength and longer life, that even with a transformer in each bay, the overall wiring cost is not appreciably greater.

On the power side we should say that the problem of group and individual driving has the greatest influence. Within certain limits individual driving and bus-bar distribution certainly appear to be complementary, while, to say the least, overhead distribution and overhead shafting is extremely cumbersome. It does not always appear to be appreciated that often the lower total loading resulting from diversity of operation is more than countered by the increased loading resulting from reduced power factor at loads below the rating at which power factor is usually specified.



Some buildings offer fine opportunities to the cable-laying craftsman

Choice of Method

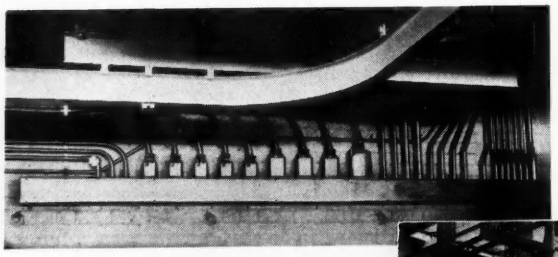
Of the many things which influence the choice of a main distribution scheme the most important is probably the type of factory, and for convenience in presentation we divide factories into two main classes—those in built-up areas, which are generally multi-storey buildings, and those on outside estates, which are usually of the single-floor type. While the latter type presents a better opportunity for approach to the ideal "network" and more elastic system because of fewer structural restrictions, the former type is certainly a more profitable field for the exercise of the contractor's ingenuity.

Attempts are being made to lay down hard-and-fast rules for these types of factories—a dangerous and limiting procedure. We agree that there are better opportunities for the bus-bar system in the single-floor factory and, of course, for rising mains in the multi-storey building, but we certainly cannot accept the assertion that obstructions always rule out the bus-bar scheme in the older type of factory. Indeed, we know of factories, each made up of various old adjoining buildings with different floor levels, in which rigid bar systems have been fitted admirably. This type of building also often presents the greatest obstacles to rising mains, but offers fine opportunities to the cable-laying craftsman. Non-bleeding cable developments have widened the field in this connection

too, and they deserve more consideration for confined situations.

It is sometimes not appreciated until it is too late that central rising mains are often limited by the impossibility of taking more than a certain number of circuits from one point, and we know of a case where as many as four sets of risers had to be installed because of the limited ceiling accommodation for the wiring. Provision for rising mains presents an outstanding case for co-operation with the architect of new multi-storey buildings, and an excellent example of good work in this way is the central riser duct up the factory staircase.

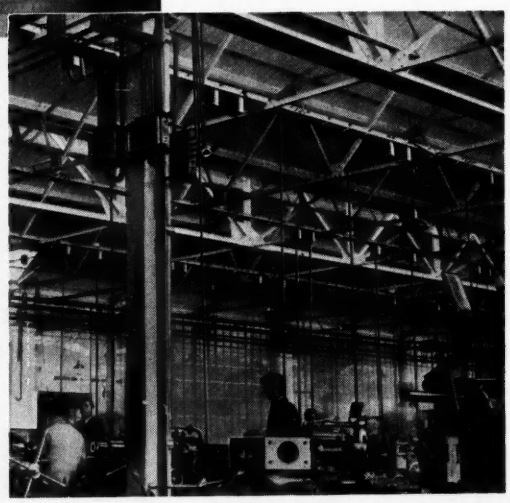
Our earlier comments on the provision of ring mains in connection with transmission trunks also apply to ring mains in factory distribution proper. It is difficult to understand why suggestions for ring mains in the factory are so often considered revolutionary, because we know of many cases where they have been outstandingly successful from the point



Trunking in some cases is sufficient at points of congestion where cables pass from the distribution centre

of view of initial and running costs and flexibility. Further, the ring-main principle can be applied to almost any known method of distribution, including the bus-bar scheme.

Too much stress has been laid upon the advantages of the bus-bar system in the matter of flexibility of machine-shop lay-out, with the result that some contractors now look upon the scheme as one almost exclusively for removable equipment. This is a great pity because a far greater asset is thereby obscured. One of the greatest difficulties in factory installation work is to cater for unknown loads and machine positions, and the bus-bar scheme offers a good solution to this problem in connection with many types of machines, including permanently fixed ones.



The overhead bus-bar system is particularly suitable for serving lines of machines which are fairly close together

It is true that, generally speaking, the system is particularly suitable for serving lines of machines which are fairly close together and that the initial cost is often prohibitive if the machines are placed more than say, 15 ft. apart. But the cost depends largely on the structural features of the building, and its true value is the relationship to the costs of other systems, which may vary very widely indeed, according, *inter alia*, to the "accommodation" the particular factory offers to the possible methods. Again, the cost relationship also depends very largely on the loading conditions of the factory in terms of its size, and it is only necessary to think of two such extremes as the small factory with 1,000 HP and the large factory with 50 HP to grasp fully the meaning of this. Beyond saying, then, that the bus-bar system is particularly suitable for large machine shops with rows of machines fairly near one another we think it best not to attempt to make rules as to the suitability or otherwise of the system for any particular set of conditions.

We feel that the bus-bar system is coming to be regarded essentially as an overhead system, and while many advantages accrue from this method of installation it is better to think more broadly of the idea and to consider its possibilities for wall and even under-floor mounting where specific conditions suggest these possibilities.

While still adhering to the contention that every distribution method should be considered for each installation, there are certain classes of works where nothing would seem so suitable as armoured cable to combine protection with flexibility. For instance, armoured cables direct to the heavy motors in some rolling mills would seem to be the only sound method. When it comes to a choice between screwed barrel and armoured cable some contractors decide on armoured cable for over 50 HP. This may serve well as a rough guide, but we know of cases where the need for easy manipulation has indicated armoured cable for very long sub-circuits.

Paper insulation is favoured for such cables on account of the higher permissible loading, but because of the higher labour costs involved the temptation not to give proper attention to sealing off has proved too strong in some cases. It is absolutely fatal not to use proper sealing-off boxes because of the hygroscopic properties of the paper. A good compromise is sometimes the use of armoured v.i.r. cable, which means more copper (lower permissible loading) but lower erection costs (simpler boxes). All underground works, whether closed or open, present a strong case for armoured cable.

Except, perhaps, for such places as rolling mills, there is hardly an installation, we should say, in which screwed barrel, properly erected, could not give entirely satisfactory results. We stress *screwed* barrel and we would recommend no other for factory work. According to the factory conditions the cost relative to other methods varies, so that from this point of view each job must be considered separately. Difficulties occur when more than a certain number of conduits have to follow the same run and in such cases metal trunking with conduit tee-offs is useful. The trunking in some cases is sufficient at points of congestion where cables pass from the distribution centre or it may take the major part of a run until the circuits "thin out."

Under-floor ducting offers great flexibility for planning where the exact positions of machines cannot be fixed before the installation is put down and where the positions of machines are altered from time to time under running conditions in the factory. It is a good scheme to run the floor ducts near the driven ends of the machines and to provide plugged screwed outlets at suitable intervals for connections to the motors and control points as required. Similar facilities can also be provided by armoured cable and conduit in floor trenches and we like the idea of terminating the circuits in switch-fuse units, surmounted by interlocking plug sockets, carried on conduit projecting a few inches above the floor.

Perhaps the greatest difficulty in factory installation work is catering for various atmospheric conditions. In most instances quite simple protection is sufficient where there is adequate maintenance. In other cases nothing short of watertightness will do. For factories with explosive atmospheres it is essential to employ recognised flameproof schemes such as metal-sheathed cable with suitable glands or armoured cable where there is a risk of mechanical damage. Asbestos insulation is good where there are high-temperature conditions, providing steam or moisture is not prevalent. Asbestos is seriously affected by moisture, so that for combined high-temperature and damp conditions mineral-insulated cable offers a good solution.

The bus-bar system serves well in those cases where the room is hot but dry. Rubber must be avoided where there are oily conditions and here again mineral-insulated cable is indicated. Acid conditions can sometimes be met by screwed barrel with machined lids to the inspection boxes, but if the acid is concentrated then pure-lead sheathing with compound sealing, v.i.r. or c.t.s. cable in fibre conduit and treated steel conduit should all be considered.

These are only a few of the conditions likely to be encountered and suggested solutions. The important thing is that each case should be carefully studied and experimented with before a decision is made and then only in the light of the type of maintenance the installation is likely to receive. Here we approach a knotty problem for the installation engineer to consider. He is tempted to regard maintenance as no concern of his, but that is a dangerous and unprogressive outlook.

For help in our investigations leading to this article we are indebted to the Mortimer Gall Electrical Centre; Drake & Gorham, Ltd.; Falconar Cross & Co., Ltd.; Reynolds & Bradwell; Alexander Milne & Co.; Rashleigh Phipps & Co., Ltd.; Marryat & Place, Ltd.; Walker Bros. (Electrical Engineers), Ltd.; D. S. Munro; J. & T. Robinson; F. Wingfield, Ltd.; the Berkeley Electrical Engineering Co., Ltd.; Grierson, Ltd.; and Duncan Watson (Electrical Engineers), Ltd.

CONTRASTS IN TARIFFS

Demand-limit and Load-rate Types

By R. B. Rowson, A.M.I.E.E.

IN the load-rate tariff the consumer is charged a high rate per kWh—usually corresponding to the normal flat rate for lighting—at times when his demand is below a specified level. When his demand increases (fig. 1) the price charged is relatively low—usually corresponding to the flat rate for cooking, &c.

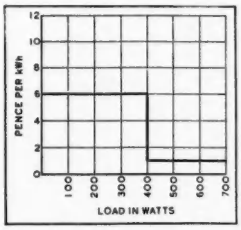


Fig. 1—Specimen load-rate tariff

The tariff appears to have been usually applied to domestic premises, the meter devised for segregating the two rates being available in the prepayment type[1]. If it is assumed that the number of kWh supplied to a consumer at the high rate is approximately the same, whether the facility for using the lower priced units is available or not, a table may be drawn up showing the average price per kWh used. For example, if a consumer takes 50 kWh per annum at 6d. and all further consumption at 1d. per kWh, the average price paid would be: for 100 kWh per annum, 3.5d.; for 150 kWh, 2.66d.; for 250, 2d.

Fig. 2 shows that the lower part of the demand curve for the individual consumer considered is the same as that under a two-part tariff of 25s. per annum and 1d. per kWh.

Though the consumer may not take his whole supply at the low rate, he has the opportunity of doing so. For instance, he might decide to make a continual demand of 500 W plus, say, his assumed normal demand of 100 W for lighting and wireless. On the tariff assumed in fig. 1 the cost per hour would be $\frac{600}{1000} \times 1$d., i.e., 0.6d. This is the same as the cost of operating his wireless and lights only on the high rate (0.1×6d.) As a consequence he obtains 0.5 kWh per hour at no extra cost.

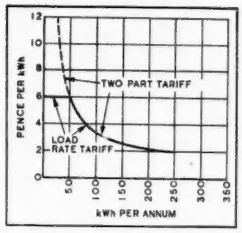


Fig. 2—Two-part and load-rate tariff comparison

To overcome this difficulty the change-over device may be set to operate at a higher value, say, 900 W. In addition, the ratio between the two rates may be reduced. There are, however, limits to this ratio. A high rate of less than 4d. would usually conflict with the normal lighting tariff and a low rate of more than 1d. would not encourage the use of heavily loaded apparatus.

If the change takes place at 900 W the consumer might well decide to use a 1-kW fire during all lighting hours. On the assumed tariff the cost of the 1.1 kWh he would use each hour would be 1.1d. If he used 0.1 kWh per hour the cost would be 0.6d. per hour, a difference of 0.5d. For this halfpenny he obtains, however, one kWh. This example shows that the incremental cost per kWh to the consumer is under certain conditions considerably less than the price per kWh of the low rate.

Figs. 3 and 4 illustrate the position for one particular tariff. Under certain conditions it will be seen that the consumer obtains his incremental kWh for nothing. To obviate this anomaly the tariff must be designed so that AX (fig. 3) is less than BY. In the present example this condition occurs if the high rate is 4d. instead of 6d. Fig. 4 shows that the demand has to exceed 3 kW before the incremental cost per kWh (in excess of the basic or normal demand) approaches reasonably close to the low rate under the assumed tariff.

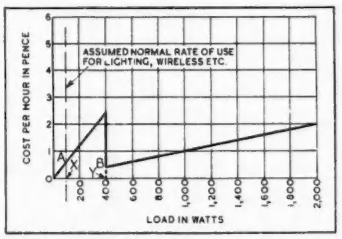


Fig. 3—Total costs per hour under load-rate tariff. Change over at 400W, with a high rate of 6d. per kWh and a low rate of 1d.

Possibility of Abuse

From the foregoing it appears that the tariff was designed entirely from the consumer's point of view. Some means had to be found to enable him to use heavily loaded apparatus at a price he could afford to pay and without undue complication, but the possibility of abuse and of conflicting with other tariffs is a real one. Moreover, the consumer is almost encouraged to make a high demand. Though he may have noted remarks in the daily Press to the effect that maximum demand must be cut down to reduce costs, he finds that his costs are less provided his demand exceeds, say, 400 W. The tariff offers no inducement to the consumer to secure a good load factor, and in fact charges good load factor apparatus (e.g., the wireless set) at the higher rate. Some attempt to keep the consumer off the peak could be made by arranging that the change-over device ceased to function at certain hours of the day.

The demand-limit tariff, sometimes known as the Ferrari tariff, also needs special metering apparatus. A consumer taking supplies under this tariff contracts that his normal demand will be, say, 2 kW, for which he may pay a fixed charge of from £4 to £15 per annum, depending upon the expected diversity with the supply peak and other local circumstances. All electricity supplied during times when his demand does not exceed his contracted demand is charged at, say, 0.5d. per kWh. On the other hand, electricity supplied during periods when his demand exceeds the contracted demand, is charged at a higher rate, e.g., 4d.

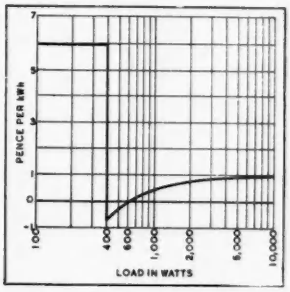


Fig. 4—Load-rate tariff: price per kWh for electricity supplied in excess of that used for lighting, etc. (Tariff as fig. 1, lighting demand 100W)

The number of kWh charged at the higher rate may be (a) all those supplied while the demand exceeds the contracted demand or (b) only those supplied in excess of the number corresponding to the contracted demand. Fig. 5 shows the number of kWh charged under the two alternative methods, the assumed load curve being the same in each case. In case (b) the proportion charged at the high rate may be ascertained by using a meter incorporating a synchronous motor. The motor drives one side of a differential at a speed proportional to the contracted demand. The other side of the differential is driven by the meter and the arm carrying the planet wheel revolves at a speed proportional to the difference between the two quantities. If a ratchet is fitted the number of kWh taken at times when the demand exceeds the contracted demand may be measured[2].

A further refinement, due to Ferrari, is to measure the consumption over periods of 15 or 30 min.[3] If the contracted demand is, say, 12 kW and the resetting period of the indicator is 30 min., Ferrari's indicator shows the number of times the consumer has used 6 kWh in 30 min. or less. The consumer thus obtains the advantage of averaging his demand in the same way as he does with a Merz demand indicator.

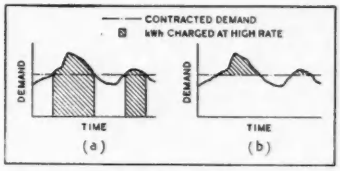


Fig. 5—Demand-limit tariff

To obtain a cheap supply under the demand-limit tariff the consumer must keep his demand within reasonable dimensions. Indirectly, therefore, he is induced to operate his plant for as long as possible, as by this means he can compensate himself for the reduced demand. In this respect the tariff is much the same as the ordinary two- or three-part tariff, including a maximum demand charge. The important point is, however, that the penal effect of temporary increases in the consumer's demand is avoided.

Problem of Short-period High Demands

Undoubtedly the greatest difficulty with the Hopkinson tariff is caused by occasional short-period increases in demand. These may be inadvertent or not. An example of the former is when a machine has a tight bearing. This may cause an increase of the consumer's demand for an hour or so of, perhaps, as much as 5 kW. Though the supply authority may, after representations, agree to forgo the charge due to the extra demand, the consumer must lose confidence in the method of charge if the supplier can arbitrarily neglect such an increase in demand. With the demand-limit tariff such adjustments are unnecessary as, in effect, the consumer only pays for the increase in demand for the period it lasts.

From the consumer's point of view the difficulty of short-period increases in demand is solved. The risk taken by the supply authority is, however, considerably increased, and the tariff is really only justified if such sudden short period increases in demand can be assumed to have a high diversity. On the other hand, by making the high rate sufficiently high the full kW charge on the consumption at that rate is fairly soon recovered. A lot depends on the characteristics of the load to which the tariff is applied. In the case of shop lighting, for example, a short time increase in demand of a premeditated nature may occur during the week before Christmas. In such a case the diversity would probably be small or non-existent and to guard against this the high rate would have to be very steeply graded.

By carefully proportioning the two kWh charges the possibility of the consumer's contracting for a "normal" demand of less than his true requirements may be considerably reduced. Suppose, for example, that the appropriate three-part tariff for a particular supply is a fixed charge of £20 per annum, a kW charge of £4 per annum and 0.4d. per kWh. The same tariff could be put forward as a demand-limit tariff with a high rate of, say, 6d. If the consumer's normal demand were, say, 10 kW, then the tariff would be put forward with the proviso that all kWh supplied each 30 min. would be registered and those supplied in excess of the first five would be charged at 6d. each.

Thus, one can purchase only 160 kWh (i.e., $\frac{4\times240}{6}$ for the price of an extra kW of demand. As in almost all industrial applications the number of hours of use per kW is well above this figure it clearly pays the consumer to declare his normal demand at a sufficiently high figure. If the supply were for shop lighting, however, it would probably be necessary to make the high kWh rate such that perhaps 50 to 80 kWh equalled the cost of one kW. In spite of the relatively high rates suggested for the upper rate under the demand-limit tariff the effect would in general not be anything like so severe as that due to an increase in demand under the more usual method of charge.

Deterrent Effect

Comparing the two methods of charging for excess kWh, under method (a) the number of kWh charged for at the high rate is much greater than under method (b). From this point of view method (a) would have the greatest deterrent effect and would save the necessity of making the higher rate look too frightening. On the other hand, the larger the consumer the greater the penalty. For example, if the normal demand is 10 kW and during one half hour 10 kWh is taken, then under method (a) the number of kWh charged at the high is rate is ten, and under method (b) five. Had the normal demand been 100 kW with 55 kWh taken during the half hour, then 55 kWh would be charged under method (a) and 5 under method (b). Thus, method (b) is the most equitable as between one consumer and another. On the other hand, the deterrent effect is too valuable to be lost in the case of some types of load.

It may also be argued that the consumer has already paid all the fixed charges associated with his normal demand and therefore all kWh supplied up to this rate of use should be charged at the low rate (0.5d. in the example) irrespective of his total demand at the time. On this argument (b) is the correct method of charge, and the higher rate must be graded sufficiently steeply to obviate the risk mentioned above.

A further refinement in the tariff can be attained by time-switch or remote control so that excess demands in certain periods only are recorded. As, however, the supply authority is already taking a gamble that the excess demands will not coincide, it adds considerably to the risk to shorten the hours during which payment for excess demand is made.

There appears to be no doubt that the demand-limit tariff can be successfully applied to factory loads, but whether it is applicable to domestic loads and to shop lighting is not so clear. Both of these loads are of a seasonal nature and the special risk associated with shop lighting has already been mentioned. In the case of the domestic load the main difficulty would be in regard to electric fires and a very stiff upper rate would be needed if the supply authority were to have any hope of recovering its kW charges during a cold snap. On the other hand, if suitable apparatus were developed, the domestic consumer might be encouraged to improve his load factor by the attraction of the very low price which could be offered for all supplies taken at a rate of use less than the contracted demand. Even where a cooker is installed the contracted demand could be relatively low if the meter operated on the Ferrari principle and if the demand were averaged over 30 min.

In conclusion, the two tariffs may be compared in a tabular statement:—

Demand-Limit Tariff	Load-Rate Tariff
An annual sum in respect of management expenses, accounting charges, etc., can form part of the tariff.	The tariff does not include a fixed annual charge.
A charge is made depending on the consumer's "normal" demand.	No charge is made in respect of kW. demanded.
Electricity taken while the demand is below an agreed normal demand is charged at a *low* price per kWh.	Electricity taken while the demand is below an arbitrary figure is charged at a *high* price per kWh.
Electricity taken while the demand is higher than normal is charged at a *high* price per kWh.	kWh taken while the demand exceeds an arbitrary figure is charged at a *low* price per kWh.
A good load factor is encouraged.	A good load factor is not encouraged.

Both tariffs recognise the possibility of diversity. The diversity recognised by the demand-limit tariff, however, is a special one, being the diversity between accidental or intended increases in demand. In the load-rate tariff the diversity is that between the system demand and the heavily loaded apparatus the consumer is encouraged to use. Any justification for the load-rate tariff must assume that kWh supplied at the secondary rate do not cause any increase in the peak demand of the undertaking and that no additional capital charges are suffered by reason of the increased supply capacity which must be made available. Though these two conditions may have been generally true when the tariff was introduced, and may still be applicable in some undertakings, they cannot to-day be regarded as axioms. Undertakings adopting the load-rate tariff and having a morning peak might well be supplying at the cheapest rate at the time that their costs are highest.

It is apparent that the demand-limit rate has certain possibilities and may conceivably assist in helping the supply industry towards solving its major problem, i.e., how to spread the total costs of supply over its consumers in an equitable manner. It is suggested that, rather than adopt the somewhat haphazard methods that usually follow the introduction of a new tariff, some central authority might arrange that a certain number of meters capable of recording on the demand-limit system should be installed in consumers' premises in different parts of the country side by side with the existing equipment. At the end of a period of two or three years the quarterly or monthly readings of these meters would be subject to statistical analysis and general conclusions on the possibilities of the tariff could be made generally available to the industry. At the same time, if the possibilities of this method of charging are found to be favourable, a suitable publicity campaign could be arranged to induce the public to look upon any change of tariff in a favourable light.

References:—[1], *M. V. Gazette*, Oct., 1925; [2], *Ericsson Review*, No. 2, 1939; [3], *Science Abstracts*, 1937, 1400.

Line-insulator Noises

SOME of the recognised means of reducing noises from electrical sources which interfere with radio reception are summarised in "Electrical Engineering" (transactions of the A.I.E.E.) by Mr. C. V. Aggers, of the Westinghouse engineering laboratories at East Pittsburgh, Pa., U.S.A. He points out that overhead line insulators are a major source of radio noise, due to high-voltage gradients causing narrow air gaps to become ionised, so allowing glow and arc discharges to take place. These so change the distributed parameters as to result in the generation of damped transient voltages which appear in connected circuits as radio noise. Deionisation is believed to have a similar influence.

On pin-type insulators the offending voltage gradients occur between the line or tie wire and the surface of the insulator, also across the cement joints between shells, between the pin and the surface of its hole in the porcelain, as well as tangentially along the porcelain surfaces of the sheds.

Proper application of a semi-conducting glaze is claimed to reduce the air discharge materially by distributing the voltage. This not only lessens the noise-influencing voltages, but also improves the power factor, the reduction of power loss ranging from 0.98 to 0.38 W at 40 kV. Other porcelain structures, such as bushings and housings, are amenable to similar treatment. Noise voltage can be generated at either the high voltage or earthed terminals, or intermediately wherever air is overstressed. Visual corona is not necessarily a true criterion, since means used without precautions to decrease particular stresses may increase gradients elsewhere where the discharge cannot be seen.

In some localities radio noise emanating from high-voltage transmission lines becomes a nuisance not by reason of its severity but because it is sustained continuously, the daytime field strength usually being from one to 10 per cent. of the evening and night strengths. Causes are numerous, some less obvious than others. Suspension insulators ensure the lowest noise level, but asphalt emulsion applied to the pin-type has been found to be fairly effective in reducing visible corona.

Radio noise is capable of travelling a considerable distance along line conductors, not being attenuated as rapidly as is frequently assumed (distances of five miles having been mentioned), so that the insertion of radio-frequency choke coils becomes necessary in order to avoid the replacement or treatment of an excessive number of line insulators.

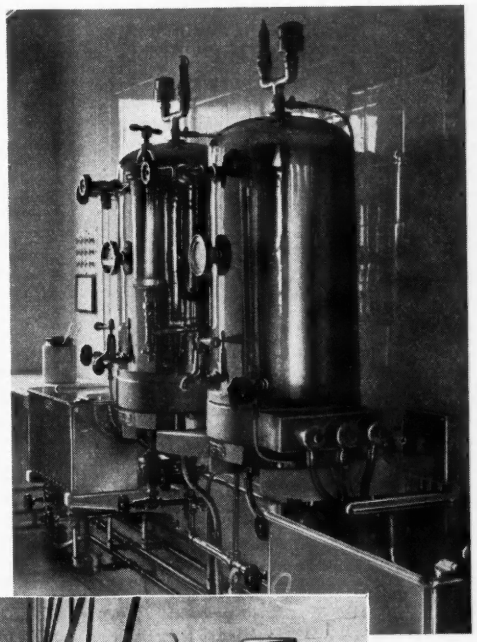
HOSPITAL EQUIPMENT

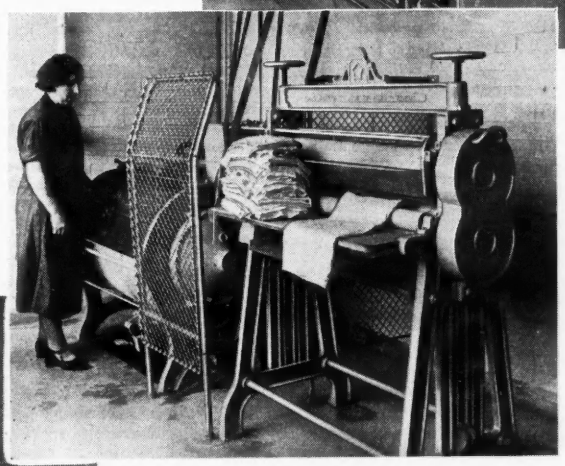
Installation at a Maternity Home

ALL the services at the new maternity home which the Beckenham (Kent) Borough Council has just opened at Stone Park Avenue, Beckenham, are electric, with the exception of the domestic hot water and the space heating arrangements. Even in the latter case, however, electricity is employed for the automatic stoking of the boilers and for pumping the hot water round the building from the storage cylinders. Furthermore, even though the main heating is by means of hot water radiators, electric panel heaters (Unity Heaters, Ltd.) are installed in the ceilings of the operating theatre and in the two obstetric wards. In each of these rooms two heaters loaded at 1¼ kW are used.

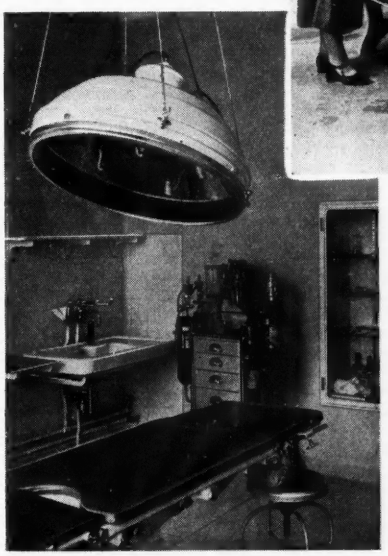
One of the most interesting items of equipment is the sterilising plant supplied by Charles F. Thackray, for the operating theatre. This apparatus comprises separate equipment for dealing with instruments, bowls or utensils, and a twin set for providing both hot and cold sterile water. The plant is so designed that it can be operated alternatively by steam from the central heating installation, or, when the boilers are shut down, by means of immersion type electric heaters loaded at 4 kW to 9 kW each incorporated in the bodies of the units. So satisfactory has this arrangement proved that the addition of immersion heaters to a similar battery of steam-operated sterilisers in the general ward, and also in the isolation block, is under consideration. To keep the atmosphere of the sterilising rooms pure, Vent-Axia exhaust fans are used.

A K.B.B. "Ideal" lamp gives shadowless lighting for the operating table, and if the main supply fails, there is no fear of the theatre being left in darkness, as one set of lamps is connected through a relay to a 50-V Chloride "Keepalite" emergency lighting system. Special adjustable inspection lamps are fitted in the obstetric wards, while in the general wards the ceiling pendants are equipped with two lampholders taking 100 and 15-W lamps respectively, and enabling "full" or "dim" lighting to be secured by means of two-position switches. All the lighting fittings installed were manufactured by Troughton and Young, Ltd., and Wardle Engineering Co.





Electric washer and wringer in the laundry at the Beckenham Maternity Home, with (above) the electric sterilising plant.



Shadowless lighting of the operating theatre is provided by a K.B.B. "Ideal" lamp.

The cooking equipment is very comprehensive. In the main kitchen on the ground floor are a double oven and a bank of four hotplates (Jackson), a Crypto potato peeler and a B.T.H. refrigerator. Two electrically heated trolleys (Jackson) each with a loading of 1.6 kW are used to transport the hot food from the two ward kitchens in each of which are installed a Jackson oven, a B.T.H. refrigerator and a Premier kettle and toaster.

In the hospital's own laundry an "Ibis" washer and wringer (Isaac Braithwaite & Son) is driven by a 2½-HP, 725-RPM three-phase motor through shafting. A James Keith & Blackman fan speeds up operation in the drying room and provision has been made for three power points for irons. The plug sockets used in this department, as indeed, throughout the whole building, are of the Walsall watertight type.

Among the other electrical equipment with which the hospital is equipped are Gent call bell and fire alarms; Permaheat electric blankets; J. & E. Hall passenger and service lifts; Standard automatic telephones; Riley automatic stokers with ¾-HP, 1,425-RPM Normand Electrical motors and rheostatic control gear; Westerham circulating pumps with two 1-HP and two ¾-HP motors by Laurence Scott and Electromotors and Allen West starters; Glover paper cables; G.E.C. v.i.r. cables and conduit; and Sanders control gear.

The work was carried out to the plans and specifications of Messrs. Handcock & Dykes, consulting electrical engineers. The electrical contractors were Electrical Installations, Ltd., H. J. Cash & Co., being the contractors for the heating and hot water supplies.

Industrial Switchgear

A PUBLICATION (No. SG.17) that is likely to be of great service to the works electrical engineer has just been issued by Johnson & Phillips, Ltd. It embodies in a convenient form seven articles on switchgear by Mr. R. T. Lythall which have appeared during the past three years in the ELECTRICAL REVIEW. Five of these deal with problems associated with lower voltages, which become of increasing importance with the growth of currents to be dealt with. In some respects these involve greater difficulties than are present in high-voltage work, which has hitherto attracted more attention. They are probably more urgent also in view of the greater possibility of trouble due to the carrying out of extensions without full realisation of the nature of the fault conditions involved.

Among the points clearly and logically made by the author are the greater importance of fault current compared with kVA ruptured, the need for sectionalising to limit short-circuit kVA, the matters that require especial attention in maintenance, and also the ameliorating effects of equivalent high-voltage reactance and lower-voltage impedance, which may appreciably influence the duty of circuit-breakers. In the latter case calculations based on self and mutual inductance of bare copper are often laborious, but a table devised by the author and reproduced will be found to give sufficiently close results in practice. The final article is a critical review of the provisions of BSS. 116-1937 which relate to the proving of high-voltage switchgear. An addendum contains useful formulæ and data regarding short-circuit calculations.

In view of the rapid extensions and modifications to electrical installations that are being carried out at the moment and the essential need for sound planning of works distribution systems, it is to be hoped that this publication will be studied by works engineers with the close attention it warrants.

MAINTAINING GOODWILL

The Representative's Part

By "Sala"

IN these days a representative's job is considered so unproductive that many firms have either dispensed with the services of their representatives who were still available or have called them in to take up more productive work in one section or another of the manufacturing plant.

In his capacity of a well-informed liaison officer a good representative is an indispensable asset to his employer and his work certainly cannot be called unproductive. More than ever, to-day, is his assistance of value both to his employer and his customers. His regular calls enable him to keep abreast of the additional requirements of his customers and to assist them with advice on the choice of equipment which will best enable them to achieve the maximum output demanded of them. Buyers, always busy men, may not be able to give him as much of their time as previously, but they still appreciate regular visits from representatives who are ready with helpful suggestions, and with the ability to answer any queries which are raised regarding the uses of the products in which their firms specialise.

The daily reports of a representative, if read intelligently by his employer, can greatly assist in forecasting future requirements. Admittedly, the report may resemble a list of customers all of whom are clamouring for delivery of outstanding orders, but if the representative has explained the position in which each of these customers is placed, it will do much to assist his employer in allocating at least a share of the works output to satisfy them. The order books of most manufacturers to-day are crammed with orders not only from their regular customers, but from new customers who were not previously users of their products. Quite a large proportion of the orders also are likely to be from firms who in the past have been staunch supporters of the manufacturers' competitors, but who regard the present time as inopportune to have all their eggs in one basket.

The part of the manufacturer is not a pleasant one. For months his plant has been working day and night, now it is working week-ends also. Extensions have been made, processes have been speeded up—and all these things are not done without attendant worry and partial disorganisation—yet he is still unable to satisfy the abnormal demands. He uses his judgment in allocating his output in such a way that priority orders are satisfied, and that each customer receives what the manufacturer considers a fair share of the weekly production, but all he gets are complaints that the part delivery he has made is so small as to be almost useless.

It is hard for the manufacturer to keep his maximum enthusiasm in view of these discouragements, but he can get a great deal of assistance from his representatives by allowing them to make their regular calls, so far as petrol allowances and travelling facilities will allow. A full explanation of the difficulties intelligently explained to the customer will save much bickering and telephoning and frayed tempers which achieve nothing, and have a bad habit of being remembered by the customer at most inconvenient times when trade is more difficult to obtain. The representative knows his own customers well. They are his friends and neighbours, and he is able to explain difficulties to each one of them in a way which they understand. His tactful handling of the situation gives no offence to the customer, and after all, most customers are reasonable when true facts are fully explained to them, and they realise that the representative is working in their interests.

Manufacturers would do well to consider that the loss of that personal contact with their customers is likely to place them at a serious disadvantage when normal competitive times return. It is always easier to hold existing customers than to get new ones, but it is also easy to lose existing customers if goodwill is not maintained. When times revert to normal the manufacturer will be glad of all his customers, and it is the task of the representative to ensure that there is no "customer mortality." Customer mortality is always highest after a spell of abnormal business activity. This fact is significant, and quite likely it can be traced to neglect on the part of the manufacturer to maintain his personal service and goodwill during such a spell of good business.

There is no room for complacency and independence even if order books are overflowing. It costs the manufacturer nothing to remain on the best of terms with all his customers, and although even then he will not be immune from occasional "kicks," he has the satisfaction of knowing that none of his customers is harbouring grievances which might affect business relations between them. The representative is the one man who fully realises the value of goodwill, and after having worked hard for years and overcome endless obstacles and disappointments to secure a customer, it is obviously in his interests to strive his utmost to make him a customer for life.

Laying Unarmoured Cables

Commissioners' New Decisions

IN view of the need for economy in the use of steel, the Electricity Commissioners have decided to permit the use of unarmoured cable, under certain conditions, where armoured cable has been used hitherto, and they have issued a General Approval to this effect. In future they will be prepared to authorise the allocation of steel for the armouring of cables on the application of individual supply undertakings only where adequate reasons for the necessity are given.

The Commissioners consider that further economies can be effected, so far as paper-insulated cables are concerned, by undertakers ordering cables in strict compliance with B.S.S. No. 480 instead of specifying the requirements of the superseded B.S.S. No. 7. To ensure the adoption of this course they have amended No. 12 of the Electricity Supply Regulations, 1937, so as to provide that the standard of construction shall not, unless otherwise allowed, be in excess of that prescribed in the appropriate British Standard Specification current at the time of manufacture (i.e., B.S.S. No. 480 in the case of paper-insulated cables). The cable manufacturers have been notified of these decisions.

The General Approval referred to above permits the use of unarmoured lead-sheathed cables laid and protected in compliance with any of the following conditions:—(1) Drawn into pipes or ducts of approved design; (2) laid in compound-filled troughs and covered with tiles or other approved protection; or (3) laid direct in the ground (after serving with waterproof tape) and protected with (i) reinforced concrete slabs not less than 2 in. thick, 6 in. wide and 3 ft. long, suitably interlocked; (ii) concrete made *in situ* and not less than 3 in. thick and 9 in. wide, overlapping the breadth of the mains by at least 2 in. on either side; or (iii) hard-burned tiles interlocked or suitably arranged so as to prevent displacement. The coverings specified in (3) may be omitted if the mains are laid not less than 2 ft. below the surface of the ground.

Transfer of Personnel

The Electricity Commissioners have notified electricity supply undertakings that they should aim at retaining only the minimum number of skilled employees indispensable for the safety and maintenance of supply and should supplement such labour by labour of a less skilled kind. The local offices of the Ministry of Labour and National Service will assist by indicating where the services of released employees would be of greatest service in essential industries.

Cases have arisen in which supply authorities have been placed in difficulties by the leaving of employees to take up other work and it has been asked whether any control can be exercised over transfers of this character. The Commissioners have taken up the matter with the Ministry of Labour, which has referred to the provisions of the Restriction on Engagement Order. Under this, recruitment to the engineering industry will be controlled and employment exchanges will not transfer a "key" man from an electricity supply undertaking to other employment, provided they are informed that the employee is a "key" man. With regard to other employees the employment exchanges will compare the relative needs of the undertakings concerned and their importance in the national interest.

Approval of Building Works

In future it will be necessary to secure the approval of the Government's Works and Building Priority Sub-committee before any contract can be placed for any building and civil engineering works involving an expenditure of £25,000 or more (exclusive of the cost of plant to be installed). The regulation applies to proposals already approved for which contracts have not yet been placed.

The procedure to be followed by Scottish local authority undertakings is still under consideration. In all other cases applications by electricity undertakings for approval of schemes must be submitted through the Electricity Commissioners on a special form obtainable from them.

Other matters on which the Commissioners have given guidance to electricity supply undertakings include mutual assistance in emergency and labour and materials for emergency repairs.

THE CONTRACTORS' ASSOCIATION

President's Report for 1939-40

IN the course of his report for the past year, presented at the recent annual meeting of the Electrical Contractors' Association, Mr. Walter Riggs, the President, said that immediately prior to the war the Association was vigorously pressing forward with its peacetime programme, particularly the matters of unfair trading, unsuitable equipment and the compulsory registration of contractors and operatives. Anomalies in the operation of the National Standardised Wages Agreement were adjusted and arrangements made for the new zoning agreement to operate as from the second pay day in October.

Many special problems were raised by the outbreak of war, but the Association declared its attitude as "No change of address and no change in policy." It became necessary, of course, to suspend certain peacetime activities, but a careful watch would be maintained for any attempt to defeat the Association's ideals in any important particular. In spite of the war, the N.F.E.A. and the E.T.U. had accepted a Code of National Working Rules which provided for the uniform treatment throughout the country of various labour problems. It had been agreed that the new Code should come into operation on October 1st this year.

Wartime Legislation

The great amount of special legislation necessitated by the war had been carefully watched by the Association which had sought to secure adjustments where necessary. Intimate contact had been established with all appropriate Government Departments, often with very useful effect. One o fthe Council's first duties was to advise members upon the protection of their interests and an instruction was issued that all members submitting quotations for work to the value of over £100 should insert a "rise and fall" clause as a condition of their contract. Advice was also given in respect of contracts accepted before the war, and as a result of negotiations with various Government Departments the Association secured a promise of sympathetic consideration where increased costs were involved, a promise which had been implemented on numerous occasions. Members were also recommended to incorporate in their tenders a clause protecting them in the event of work in which they were engaged being destroyed by enemy action. All building owners, including Government Departments, had seen the equity of such a clause.

Electrical installation material used on contracts was originally exempt from the provisions of the War Risks Insurance Act, but an Order had now been issued obliging the contractor to insure the whole of his installation material until it was delivered to the site of the contract. The Prices of Goods Act did not at first affect the electrical contracting industry, with the exception of electric torches and batteries. Now, however, radio sets and electric clocks had been included, and no doubt a variety of electrical merchandise would eventually come within the scope of the Act. The Association had taken its full share in the negotiations in connection with the purchase tax, and he had every reason to believe that representations made on behalf of members would have the effect of reducing the burdens which would otherwise have rested upon them.

Wide powers with regard to the control of labour had been conferred upon the Minister of Labour, and in this matter the Association was carefully watching the interests of members. It had complete confidence in the work of the British Employers' Confederation. Every new piece of legislation was carefully scrutinised by the Director and where it was deemed appropriate a communication was addressed to all members.

The decentralisation of the work of the Association by means of regional conferences had received a severe setback, but he had no doubt that when the time was ripe a resumption of the conferences would be immensely valuable to the Association in spreading interest among members where apathy still remained and in securing a greater unity of purpose in the Association's activities. Coincidental with the cancellation of various meetings the Council decided to establish more direct contact with members and the whole membership had been sent a large number of letters.

The President referred to the large number of electrical contractors' employees who now had to take jobs at a distance from their homes, and said that it had been agreed that such men, although engaged on the site of a job, should receive expenses up to a maximum of 3s. a day. Negotiations between the N.F.E.A. and the E.T.U. had resulted in an agreement to stabilise hourly wages at their existing level and to institute a weekly addition to meet the increased cost of living. Certain important branches of the Association had protested at the amount of the increase and due weight would be given to their views. The Council's one concern must be to legislate not only in the interest of the members as a whole but to secure the best possible labour operation for the successful prosecution of the war.

Settling Labour Problems

Referring to a strike of electricians without the authority of the executive council of their union, Mr. Riggs said he hoped that no problem would arise which would be beyond the power of the National Joint Industrial Council to settle without the need for intervention by the Minister of Labour. He was informed that an Order would shortly be issued placing an obligation on all employers, whether federated or not, to maintain completely all the rules and regulations which were established between the recognised bodies of employers and employees of the industry in which they operated. He asked whether it was too much to hope that the experience thus gained during the war would justify its continuation.

After a reference to the Association's co-operation in the work of the British Employers' Confederation and the National Chamber of Trade, the President stressed the need for unity of purpose at the present time. He believed that this unity could best be achieved in their trading difficulties by unswerving loyalty to the Association which was charged with the responsibility of looking after members' interests.

Mr. Riggs expressed his thanks to the Executive Committee and its chairman, Mr. W. H. Walton, to the Council and other honorary officials of the Association and to Mr. L. C. Penwill, the Director and Secretary. He concluded with the hope that the Association would soon be able to meet in happier circumstances.

Gas Detector-analyser

FOR continuously indicating the purity or concentration of gas within the casing of hydrogen-cooled electrical machines the General Electric Co. (U.S.A.) has designed a detector-analyser on the hot-wire Wheatstone bridge principle.

One arm of the balancing circuit consists of an electric heater element which is energised at a constant rate so that the temperature it assumes is an inverse function of the thermal conductivity of the gas surrounding it. It is declared that if a hot wire element is placed axially in a metal tube whose internal diameter is less than one centimetre, and the surfaces of both wire and tube are polished so as to reflect heat radiations, at least 99 per cent. of the heat loss will be by conduction, the negligible remainder being by radiation and convection. Thus temperature change is a measure of the percentage of one gas in the sample mixture flowing through the heater block cell, which contains two dual spiral filaments.

A three-position switch permits transfer from one scale to another, marked "H_2 in CO_2" and "H_2 in air" and "CO_2 in air." The sampled gas enters through a dryer-filter chamber and emerges from the analyser into a bubble bottle which serves both as a seal against back flow and as a flow regulator. A constant voltage transformer energises the instrument as well as the moving coil of a light-beam-type AC galvanometer, which acts both as a visual indicator and as an automatic alarm, by means of a pre-adjustable shutter that masks a portion of the beam falling upon a photo-electric relay.

Other possible uses of this detector-analyser are referred to in the *General Electric Review* (America) for April, 1940, which describes the construction and operation of the new instrument in some detail.

Generous Offer from Canada

AS we mentioned last week, the Institutions of Civil, Mechanical and Electrical Engineers have received through the Engineering Institute of Canada a generous offer by which members of the three Institutions who are sending their children to Canada could arrange for their children to be received into the homes of Canadian engineers.

Applications can be received at present only from those members of the three Institutions who have already registered under the Government's scheme. A member who has so registered and who wishes to take advantage of the offer should inform the secretary of his institution immediately. When he receives the official notice of acceptance, he should again get into touch with the secretary of his Institution, who will furnish him with a certificate to ensure that the child in question is included in this scheme, for submission with the acceptance form. In order that a complete record may be kept, members are asked to inform the secretaries of their Institutions as soon as the child leaves home for the port of embarkation.

Members who have not registered their children but who are interested in this scheme should so inform the secretaries of their Institutions pending the re-opening of registration.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Urgent Need for Scrap Metal

THOSE industries which use iron and steel, or whose equipment involves the use of machinery, have been approached by the Iron and Steel Control with a view to their making available such supplies of iron and steel scrap as are in their possession. There has been a considerable response to this appeal, and that response has been largely helped by the ready co-operation of the technical Press. There is, however, evidence that there is still a large amount of available iron and steel lying in factory yards and sheds, and in maintenance departments, which might well be surrendered as scrap in the national interest at the present juncture.

Everybody is aware that it is characteristic of maintenance engineers, and those who are in charge of repair and maintenance departments of works generally, and who are keen and conscientious, to make it a habit to keep supplies of spares and, indeed, of obsolete parts and machinery, lest on some future occasion when the need arises they should be found short. There can be no criticism of this attitude. On the other hand, the national need for all the available iron and steel, either as discarded machinery and parts, or as scrap, is so great to-day that it outweighs even the advantages of providing against the future so far as individual firms are concerned.

I am therefore writing to you in order that, through the medium of your paper, I may appeal to heads of firms to see that as much of this kind of material as possible is given up for the purpose of being converted into iron and steel for munitions and armaments. May I suggest to them that even the provision of what may possibly be needed in the future by their own firms should take second place to the urgent national need. We all know that armaments and munitions for the fighting forces are needed in ever-increasing quantities. These cannot be provided in abundance unless a continuous flow of scrap is forthcoming. Therefore, I make this further appeal that everyone should join in this drive, even if it involves a little personal sacrifice. H. E. CRAWFURD.

London, W.C.2, *July 4th.*

[In case of difficulty, or for guidance, firms should write to the Iron and Steel Control, Steel House, Tothill Street, S.W.1.—EDS. ELEC. REV.]

Inquiries for Switchgear

I was very interested indeed to read "Cubicles" article on page 6 of your July 5th issue on the problems set by customers who are inquiring for switchgear and starting gear, and would like to congratulate the writer of this article, as it covers inquiries where the inquirer either has not taken the trouble or has not the knowledge to send in an inquiry which can receive immediate attention.

We get innumerable cases of the kind quoted by "Cubicle," and the waste of time, cost of postage, etc., quickly adds up when trying to get the information necessary to submit an intelligent tender. ERSKINE, HEAP & CO., LTD.

Salford, *July 5th.* R. A. Erskine, *Managing Director.*

The Over Fifties

In his letter in your issue of June 28th "Non-Senex" raises an old question in a new form in relation to the old (?) fogeys of fifty and over. Something should be done to cut out the unfairness and injustice to active and able men who are put down as commercially useless after forty-five.

There is not the slightest doubt that many men who are between fifty and sixty could give points to much younger men as is witnessed by our excellent Premier and our Army, Navy and Air Force leaders. Why then should experienced engineers with high qualifications and who are both active and physically fit be turned down simply for having lived for half a century or more?

The state of matters is disclosed weekly in the "Situations Vacant" columns of the ELECTRICAL REVIEW, and one seldom sees the proviso "must be at least forty-five years of age."

Glasgow, *July 4th.* ALEX MILNE.

Commutator Trouble

I should be pleased if any of your readers could enlighten me regarding the following. The trouble in question is on a small battery-charging generator, 75 V, 20 A. This machine behaved perfectly on test and the commutator has the nice brown polished appearance which is only attained when a machine is giving perfect commutation. The generator is fitted with interpoles which are not really necessary on a machine of this low voltage.

After the machine had been running about three months on half load a complaint was raised that it was sparking badly. On investigation it was found that about three segments of the commutator were black and the mica "proud," while the remainder of the commutator was in perfect condition. It was naturally suspected there were some badly soldered joints in the commutator and this was drop tested but failed to show anything faulty. The commutator was resoldered as a precaution, it was then re-turned and the mica recessed.

After three months' running exactly the same thing happened again. I had a similar experience on a battery-charging generator many years ago and never got to the bottom of the trouble. I should be very grateful for any enlightenment.

July 8th. COMMUTATOR.

Illumination Values

The points raised in your leaderette of July 5th under the above heading are clarified by further quotations from the B.S. Glossary:—"Candle-Power: Luminous intensity expressed in candles," as quoted by you. "Candle: A unit of luminous intensity . . ." "Illumination: The luminous flux reaching a surface per unit area. Symbol E." "Foot-Candle: A unit of illumination . . ."

Thus, "intensity" clearly refers to the light emitted by the source and "illumination" to the result of such light impinging on a surface. There is, therefore, no excuse for using "intensity" when we mean "illumination." Also the expression "illumination value" is preferable to the hybrid term "illumination intensity."

It is regrettable that misuse of the term "intensity" should have appeared in official publications and in a journal of such high standing as the ELECTRICAL REVIEW.

HOWARD LONG, M.I.E.E., F.I.E.S.

Birmingham, *July 6th.*

An Electrical "Spitfire"?

I would like to put forward a scheme whereby members of the electrical industry could raise money to buy a "Spitfire" plane.

My idea is that all readers of the ELECTRICAL REVIEW who are in the electrical industry should send one shilling for every year they have been in service with an electrical company, either supply, manufacturing or sales distribution. I have been in the industry for the last 42 years, and if there are many men with my length of service who would send a shilling for each year, it would soon mount up to a very big sum. Of course, there are many who could make a bigger contribution, but I feel that an effort from the readers of the ELECTRICAL REVIEW of this nature is something which would be appreciated and welcomed by the Government.

A. S. TONG,

Newcastle, *July 5th.* *Manager*, Newcastle Branch.
Foster Transformers & Switchgear, Ltd.

How to Sell "Electrics"

Writing as one outside (practically) the electric vehicle circle (I am connected with a world-famous motor firm) I have been very interested in the recent correspondence on this subject. I must admit that the electric vehicle has a very strong case for local deliveries but, in my opinion, the manufacturers themselves do not apparently realise the possibilities. The sales departments lack vision and fail to co-operate properly with the designers, or so it would appear to an interested outsider.

Why has the petrol-driven vehicle made such rapid progress during the last 20 or 30 years? The leading factor has been service. One make only has by a skilful sales programme built up a network of well-equipped dealers and repairers. From these dealers, constantly in touch with the buying public, they have not been too proud or obstinate to accept suggestions on either selling policy, general design, or spares organisation. Consequently, these dealers who under their agreement stock the product and the spare parts have been welded into an immense selling organisation which annually budgets ahead for thousands of vehicles.

Compare this with the manufacturers of electric vehicles who in most cases endeavour to forecast the next year's production from a manufacturer's point of view. The first suggestion, therefore, is that they appoint "stocking" dealers who already have experience in the commercial vehicle retail trade and that they should be asked for constructive criticism from the customer's angle. For instance, nowadays the driver expects some degree of comfort, and any dealer with retail sales experience knows that often the views of the man who has to drive the vehicle have an important bearing on the choice. The general appearance of some electric vehicles gives credence to the idea that the men who designed the chassis designed the bodies. The electric vehicle is built for long service in addition to general utility—don't let it be described as a "museum piece" at the outset of its life. It is possible to have a commodious van or truck which is not ugly and unbalanced looking.

The remarks passed by "Observer" in your issue of June 7th on the apparent apathy of the supply undertakings

are certainly justified from a sales angle. How many electricity companies have made any effort to assist electric vehicle sales by providing an attractive tariff for charging traction batteries? The "½d. per unit" mentioned in sales literature is by no means universal and consequently the salesman who sells on "cost per mile" has to vary his figures for different townships covered by his sales territory.

Another complaint is the lack of service facilities, due no doubt in part to the fact that manufacturers use proprietary units such as rear axles, controllers, meters, &c. Because the electric vehicle is not backed by a repairs service comparable to petrol-driven vehicles, and because the small business man concerned with local delivery considers that time off the road is money lost, the electric vehicle salesman is at a disadvantage. Fleet owners can generally adjust their services when a breakdown occurs—the owner of a single vehicle is paralysed.

My second suggestion, therefore, is that the manufacturers should see that their dealers are competent to carry out general repairs and that they stock parts and service units. Sales must be backed by efficient service facilities. It is a fact that steady production and sales, coupled with organised dealerships, have lowered the initial cost of cars generally whilst value has risen.

If the manufacturers of electric vehicles have enough faith in their product to develop along similar lines, whilst retaining their individuality, I am confident that they will become very serious competitors of ours in the future. At present we do not regard their efforts seriously owing to the limited production and high initial cost. T. MARRIOTT MOORE.

Sale, Ches., *July 3rd*.

Electric Gas Lighters

An advertisement which appeared in "The Telephone," dated 1889, will interest your correspondent. It announced "Matchless Electric Gas Lighters, 12s. 6d. each. Woodhouse & Rawson, 11, Queen Victoria Street, London, E.C." The illustrated article is different from the G.E.C. product at or about that time. L. E. WILSON.

Manchester, *July 8th*.

In the Courts

Alleged Defective Electric Iron

IN the King's Bench Division on July 5th Mr. Justice Hilbery concluded the hearing of an action brought by Mr. and Mrs. Denis Abbott, Buckhurst Hill, Essex, against Morphy-Richards, Ltd., St. Mary's Cray, Kent, and the County of London Electric Supply Co., Ltd., for damages for personal injuries sustained by Mrs. Abbott through the alleged negligence of the defendants.

Mrs. Abbott had a Morphy-Richards electric iron and Mr. Abbott directed the County of London Electric Supply Co. to provide and fix a plug to the flex and this was done by the company's representative. Plaintiffs' case was that shortly afterwards Mrs. Abbott took hold of the iron, when she received a severe shock, with the result that both her hands were burned and she suffered pain and was disabled for some time. The plaintiffs alleged that both defendants had been guilty of negligence and that the iron was defective and as against the second defendants it was alleged that the work of connection was improperly done.

Both companies denied negligence and alleged that Mrs. Abbott was negligent in using the iron when it was unsafe to do so, after dropping it. Mrs. Abbott denied that she had ever dropped the iron.

Mr. Morphy, managing director of the first defendant company, said that his company had sold over a quarter of a million of the irons and had never had any complaint of anybody having received a shock. The accident could not have happened without a break in the back plate. The wrong attachment of the wires had nothing to do with the shock Mrs. Abbott received.

His Lordship, in giving judgment, said the fitter of the County Co. connected the flex with the plug and it appeared to be in order and a few days afterwards Mrs. Abbott used it. Later on when she used the iron again she received a severe shock and dropped the iron. The iron had a bakelite handle through which the electric wires passed. The bakelite handle, if perfect, gave complete insulation. He came to the conclusion that the plaintiffs' claim failed on two grounds, *viz.*, that the circumstances of the case showed that the iron was perfectly packed and that there had been given ample opportunity of inspection and, secondly, on the ground that the evidence did not show that the iron was damaged when sold. If the iron had been defective or broken the man who had wired it would have discovered it. According to the evidence, even if the iron had been wrongly wired it would have been safe to use. He could find nothing misleading in the book of instructions which accompanied the iron. He found a breach of contract on the part of the Electric Supply Co. in the wiring of the iron to the plug.

He gave judgment for both defendants against Mrs. Abbott, with costs, and for Mr. Abbott on the breach of contract by the second defendants for 40s. nominal damages without costs. A stay was granted with a view to a possible appeal.

Rating of the Grid

The Court of Appeal consisting of Lords Justices Scott, Clauson and Goddard on July 5th delivered judgment in the case of the Barking Rating Authority *v.* the Central Electricity Board, a test case which affects the grid throughout the country. The case came before the Court on the appeal of the Rating Authority against the judgment of a King's Bench Divisional Court last April in favour of the Central Electricity Board. It concerned the value for rating purposes of the Board's transformer sub-station at Barking and other equipment including transmission towers, pilot wires and lines attached to the Barking power station.

The main question raised by the case was whether the rateable value of the premises should be arrived at on what is known as the "profits basis" or whether a test of percentage on capital value should be applied. The premises in question were assessed in the Barking valuation list at a rateable value of £1,244, and on May 26th, 1934, the Board objected to the assessment on the ground that it was excessive and unfair. On January 18th, 1935, the Rating Authority made a proposal to amend the list by increasing the assessment to £8,436 against which the Board objected.

The matter came before the Essex Assessment Committee which amended the valuation list by increasing the assessment of the premises to £2,100. Against this the Rating Authority appealed to Essex Quarter Sessions which decided that the correct basis of assessment for the hereditament was the "profits basis"; that it was not satisfied that there were any special circumstances such as to exclude the "profits basis"; that on the "profits basis" the rateable value of the hereditament was nil; and that there being no cross appeal the assessment appealed against would be affirmed. From this result the Rating Authority appealed to the Divisional Court which affirmed the decision of Quarter Sessions and from that decision the Rating Authority now appealed to the Court of Appeal which again supported the decision of Quarter Sessions.

Lord Justice Goddard, in giving judgment, said the Central Electricity Board maintained that Quarter Sessions was bound to accept and adopt the "profits basis" as the method for valuing the property. That was right. The decision of the House of Lords in the case of the Kingston Union *v.* the Metropolitan Water Board had laid it down as a rule of rating law that in the case of a public company or a public utility undertaking whose operations extended over several areas, the "profits basis" was the only one to be applied unless there were special circumstances which rendered the method impossible of application. After pointing out that the Central Electricity Board was a profit-making concern, as well as a public utility undertaking, the Lord Justice said that he and the other members of the Court were satisfied that there were no special circumstances in the present case that would make it impossible to apply the "profits basis" method of assessing the rateable value.

Another question raised by the Appeal was whether Quarter Sessions rightly excluded consideration of the Board's accounts and estimates subsequent to the year 1934. The rate had to be made on April 1st, 1934, and when the Rating Authority called for the production of documents relating to subsequent years the Board declined on the ground that the documents were private and that only the accounts and estimates for the year 1934 were relevant. On that point the Court was of opinion that the "profits basis" ought to be calculated not on what might happen in the future, but on the profits ascertained down to the date of the valuation list. The Quarter Sessions was right in excluding accounts and estimates subsequent to 1934 as being irrelevant. The Appeal failed and would be dismissed with costs. The other members of the Court agreed.

An application to allow the Barking Rating Authority to appeal to the House of Lords was refused.

Damages for Installation Engineer

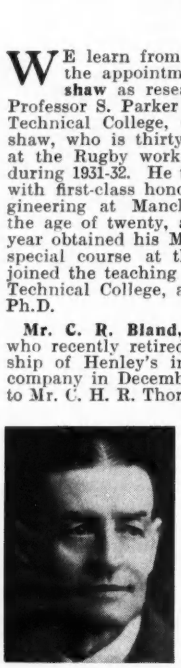
Mr. Edward R. Jones, electrical installation engineer, Sheffield, was awarded 100 guineas damages—which had been paid into court—and costs, at Notts Assizes on June 29th against Mr. George W. Eastwood, Grantham, and the Public Utilities Electric Co., Ltd. It was stated that the Mid-Lincs. Electric Supply Co. was associated with the defendant company in a contract concerning Birkholme Manor, Corby, and an employee went to the manor to report on the supply of electricity and certain work. Mr. Jones went to work out prices, but did not advise that the work should be done. The work was done, however, and was stated to have proved unsatisfactory, and it was alleged that defendant, asked who was to blame, replied: "A chap named Jones." Mr. Jones, hearing this, naturally considered it damaging to his reputation in the neighbourhood.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

WE learn from the *A.E.I. News* of the appointment of **Dr. E. Bradshaw** as research lecturer, under Professor S. Parker Smith, at the Royal Technical College, Glasgow. Dr. Bradshaw, who is thirty-one, was a student at the Rugby works of the B.T.H. Co. during 1931-32. He took his B.Sc. degree with first-class honours in electrical engineering at Manchester University at the age of twenty, and in the following year obtained his M.Sc. degree. After a special course at the Rugby works he joined the teaching staff of the Glasgow Technical College, and in April became Ph.D.

Mr. C. R. Bland, A.C.G.I., M.I.E.E., who recently retired from the managership of Henley's in India, joined the company in December, 1912, as assistant to Mr. C. H. R. Thorn, Henley's manager for India, and took over the managership in 1925 on Mr. Thorn's retirement.



Mr. C. R. Bland

In 1901 he commenced studies at Faraday House, and was awarded the College diploma. Entering the Central Technical College at South Kensington a year later, he studied under various professors, from 1902 to 1905, and again was awarded the College diploma. He then spent several years at the works of C. A. Parsons & Co., Ltd., and spent some time erecting the Parsons electric generating turbines on the old *Mauretania*. Towards the end of 1908 he became electrical and mechanical engineer to the Mold Collieries, Flintshire, where he supervised the installation of the complete plant.

Mr. Bland was one of the foundation members of the Association of Mining Electrical Engineers, which was formed during this period, and in 1911 he went to India to supervise the erection of a plant for the East India Coal Company at Jharia. He saw service in Mesopotamia with the Royal Engineers during the last war, and was mentioned in dispatches.

Out of sixty-nine applicants, **Mr. F. O. Harber,** electrical engineer to the Portland Urban District Council, has been appointed borough electrical engineer at Bangor at a salary of £450, rising to £550.

Mr. F. J. Delbeke, of Hendon, has resigned his position as managing director of the Britannia Electric Lamp Works, Ltd., but will continue as a director of the company.

Mr. P. M. Chilvers, works chemist with the St. Marylebone Borough Electricity Department, has been appointed works chemist at the generating station of West Ham Borough electricity undertaking.

Bombardier Ernest Stredwick (R.A.), a member of the staff of Venner Time Switches, Ltd., has been awarded the Military Medal. He was one of a gun detachment of six men who diverted enemy tanks and saved a critical situation. They were ordered into an emergency position near Hazebrouck and eight enemy tanks approached at 1,000 yards. The leading tank was at once put out of action and the detachment came under heavy shell and small arms fire from the others. A second tank, and another which manœuvred to the rear of the gun position, were put out of action.

N.Z. Centennial Celebrations Award.—The four authors of the paper on "Practical Aspects of Earthing" (Messrs. E. Fawssett, H. W. Grimmitt, G. F. Shotter and H. G. Taylor) selected by the I.E.E. for presentation at the Engineering Congress in connection with the recent New Zealand Centennial Celebrations have been awarded bronze medals by the New Zealand Institution of Engineers. The paper was to have been presented by Dr. A. P. M. Fleming, but his visit to the Dominion was cancelled, and instead it was introduced by Mr. E. Hitchcock, the president-elect of the New Zealand Institution.

Mr. E. Ralphs, superintendent at the generating station at Ocker Hill, Tipton, of the West Midlands Joint Electricity Authority, has retired, and has been succeeded by **Mr. J. Berry,** who has been second in command at the station. At a gathering last week, Mr. Ralphs was presented with a garden hammock from members of the Sports Club, and a gold watch from friends and colleagues on the board and staff of the J.E.A. The watch was presented by Councillor C. Tibbitts, chairman of the Authority, and Mayor of Walsall.

No nominations having been received other than that proposed by the Committee of the Meter and Instrument Section of the I.E.E., **Mr. C. W. Marshall,** B.Sc., has been elected chairman of the Section for 1940-41.

Mr. H. J. Randall, formerly manager and secretary of the City of London Electric Lighting Co., and Bankside Investment Trust, has been appointed managing director of both companies.

Mr. W. C. Gould, A.S.A.A., has been appointed secretary to the Southern Areas Electric Corporation, Ltd., and takes up his appointment on July 15th. He has been with Peat, Marwick, Mitchell & Co. for over twenty years, and he succeeds **Mr. J. N. Campbell,** C.A., who has been associated with the Southern Areas Electric Corporation, Ltd., from its formation and as secretary since 1935. Mr. Campbell has become secretary of the Home Brewery Co., Ltd., Nottingham.

Miss Valerie de Ferranti, daughter of Major and Mrs. V. Z. de Ferranti, of Alderley Edge, was married recently to Lieut. Patrick Hunter Gordon, M.C., of Inverness.

Obituary

Mr. H. A. Smith, of Westcliff-on-Sea, whose death occurred on July 1st at the age of forty years, was the principal member of Alfred G. Smith & Co., electricians and contractors, of Southend-on-Sea. He had occupied this position since the death of his father, Mr. Alfred G. Smith, some years ago.

Mr. M. Dempster.—The death has occurred in Fifeshire, at the age of sixty-two, of Mr. Moses Dempster, who was for over twenty-two years with Mavor and Coulson, Ltd., Glasgow, for whom he travelled extensively in France, Belgium, Germany, Japan and Russia. He held a first-class mining manager's certificate and had been awarded a medal for coal cutting.

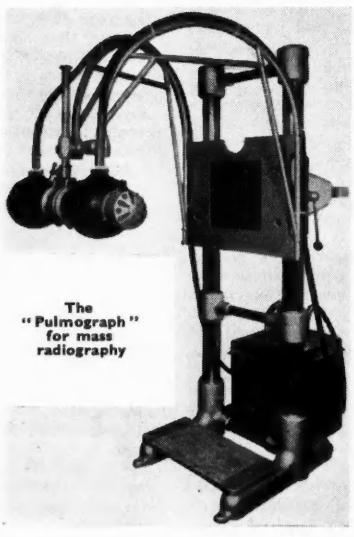
The "Pulmograph"

Self-contained Outfit for Mass X-ray Examination of the Chest

MORTALITY from pulmonary tuberculosis among young adults has not declined during the last forty years. To cope with this disease properly necessitates very early diagnosis, which often implies recognition at a pre-clinical stage. This can be done radiologically on the principle of periodic mass examination of the chest, which seems likely to be rendered less costly and more speedy by photographically recording in miniature the X-ray screen image. With this end in view the "Pulmograph," designed by Mr. P. G. Sutton, has lately been made available commercially by Stanley Cox, Ltd., 11, Gerrard Street, Shaftesbury Avenue, London, W.1.

Behind the Levey-West 14 by 14 in. fluorescent screen is a lead-lined tunnel tapering to a ciné camera specially designed for the purpose. It is entirely automatic in action, being operated by electro-magnetic relays through the X-ray exposure switch. An optical signal gives a warning when the last negative of the 35 mm. film strip is in position, and particular attention has been paid to the mechanism for speedy movement of the film.

The "Univex" 10-kW X-ray tube, which is cooled by a blower, is permanently centred with the camera on a massive stand so that both move simultaneously on anti-friction roller bearings. A daylight loading cassette holds sufficient length of film for about forty radiographs, say one per four seconds. The electrical camera is actuated by a delayed action relay that is operated by a synchronous motor timer, whose contactor is oil-immersed in the same tank as the filament transformers and the main single-valve transformer.



The "Pulmograph" for mass radiography

The output available is 120 mA at 80 kV (peak), which, with the focal screen distance reduced to 36 in., permits exposures of from one-fifth to three-tenths of a second. For identification and filing convenience, the screen image and patient's index card may both be photographed together on the same miniature film, which is subsequently viewed after processing by projection enlargement up to 14 by 14 in.

Such screen photography is not a substitute for normal examination, since it is not likely to give such fine detail as contact radiographs; also, it requires about five times the usual X-ray intensity, or a much smaller focal screen distance, but it is far more speedy. Hence the "Pulmograph" is intended solely for mass recording. Equipment has been installed for use in one of H.M. fighting forces and another model is now being designed for use with existing X-ray outfits, which may be useful for control purposes in sanatoria, while for public health services it might be convenient to employ a mobile set carried in a motor van with an extending tent arranged at the back to serve as dressing-room and office.

COMMERCIAL and INDUSTRIAL NEWS

"Civils" Lighting Installation. Munitions Speed-up. All-electric Colliery

Iron and Steel Control

THE Minister of Supply has made the Control of Iron and Steel (No. 11) Order which came into force on July 8th. It prohibits, with certain exceptions, the use of iron and steel for buildings except under licence.

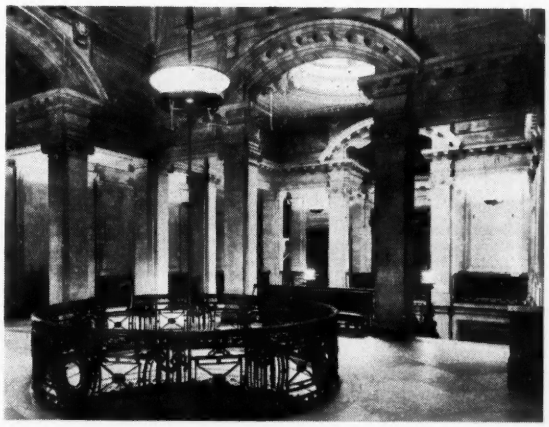
The intention of the new Order is to prohibit the consumption of iron and steel already in the hands of contractors or consumers and the sale of iron and steel by stockholding merchants for non-essential buildings. No licence will be required for the use of steel for building where the purchase of that steel has been authorised by a Department for that purpose under the Steel Distribution Scheme, or has been licensed by the Ministry of Supply (Iron and Steel Control) on or since April 1st, 1940. In order to cover urgent requirements for repairs and maintenance, the use, or the purchase from a stockholder, of less than one ton in one month for any particular building is exempt from the licensing scheme.

Any application for a licence to use iron or steel under this Order should be made to the Department to which application would be made for authority to purchase steel under the Steel Distribution Scheme.

An Institution Lighting Installation

Architecturally, the Institution of Civil Engineers, Great George Street, S.W.1, is the modern interpretation of late Renaissance style by Mr. J. Miller, A.R.S.A., A.R.I.B.A. The lighting fittings in the halls and corridors, installed in 1912, were totally inadequate for modern lighting standards, and they have recently been replaced by a new series of totally indirect lighting fittings designed by the General Electric Co., Ltd.

The central lighting well, which passes through each floor up to the cupola, presented a problem, but the difficulties were finally solved by the provision of a three-tier fitting which has been suspended from the dome. This comprises three metal bowl fittings—one fixed below the ceiling level of each floor—joined by a steel wire cable covered with fabric cord extending about 70 ft. from the cupola. These three units, although uniform in appearance, vary in their internal construction to meet the lighting requirements at the different levels, and also to provide facilities for maintenance.



Lighting of the well-centre at the Institution of Civil Engineers

Each consists of a lower bronze dish finished in white inside, surmounted by a matt white enamelled concave reflector glazed at the top with white flashed opal diffusing glass dust covers. All are designed to direct the light upward, downward, and laterally, the higher fittings being arranged to provide a greater proportion of the illumination upwards. The top reflectors are 44 in. in diameter, and the bronze finished dishes fitted below the reflectors 36 in. wide. Twelve 100-W "Osram" lamps are fitted in the lower dish of the ground floor level fitting, and one 200-W lamp in the reflector body. In the upper units are twelve 60-W lamps and eight 50-W lamps in the lower dishes and reflectors respectively.

In the bays of the corridors pendants to match the centre unit were provided in sizes varying in diameter according to their position. These are constructed in a manner similar to the bowls of the central unit and also produce a light source from the rim of the reflectors that relieves the heaviness sometimes noticeable in totally opaque bowls.

The lighting of the main staircase called for decorative harmonious treatment, and in this case the existing bronze newel standards provided a base for the new fittings. The bronze metal dishes which have now been fitted echo the form of the pendant fittings and generally tone with the scheme. Each unit is fitted with a pale champagne-tinted glass border and trumpet-shaped flashed opal glass shade. The 200-W lamps with which they are equipped have been so recessed as to be masked from the line of vision from the surrounding balcony of the first floor. Tyler & Freeman were the contractors.

I.E.E. Model Form of General Conditions

The Council of the Institution of Electrical Engineers has published additional clauses for use during the present war with Model Form of General Conditions A (Home—with Erection), revised 1938. The publication contains a memorandum and two additional clauses relating to "Price Adjustment" and "Suspension and Termination of the Works" and copies may be obtained from the Institution or the publishers, E. and F. N. Spon, Ltd., 57, Haymarket, London, S.W.1., at 6d. each.

Woman Power and the War

Mr. Ernest Bevin, M.P., Minister of Labour, is to be the chief guest and speaker at a luncheon to be held at the Dorchester Hotel, London, on July 17th by the Federation of Business and Professional Women. Viscountess Astor, the president, Miss Irene Ward, Dr. Edith Summerskill, and other women members of Parliament, will be among those present, and the chair will be taken by Miss Caroline Haslett, chairman of the Federation.

The Purchase Tax

The text of the Purchase Tax Bill was published last week. Briefly, it provides for the registration of wholesale merchants, manufacturers and persons carrying on certain other classes of business. The tax (the amount of which has not yet been stated) will be based upon the wholesale value of goods, i.e., the price to the retailer, and it will be collected from registered persons, who will include the amount in their charge for the goods. Certain classes of goods (or services) are exempt from the tax, among them being electricity and tramcars and omnibuses. The measure will not apply to businesses with a turnover of less than £2,000 a year.

Road Services Guide

All who have occasion to send goods by road, especially those who may be experiencing difficulty at present, will do well to obtain a copy of the July issue of the bi-yearly "Goods Road Services Guide," which gives details of 1,300 regular long-distance goods services, as well as hundreds of intermediate towns which they serve. A list of clearing houses precedes each section of the guide and there is a comprehensive index, covering every sizeable town in the country. Particulars are also included of machinery carriers and tank wagon operators. Copies may be obtained from Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, price 6d., or 9d. by post.

South African Tariffs

Among recent amendments to the South African Customs Tariff is the following: Motor cycle batteries are excluded from Item 119 (iii) and become dutiable under Item 119 (iv): 10 per cent. minimum duty and 20 per cent. intermediate and maximum duties.

Domestic Sales in Canada

Figures recently published in *Electrical and Radio World Trade* show that at the end of last year there were 1,625,000 wired homes in Canada out of a possible total of 2,500,364. Refrigerators headed the list of domestic appliance sales during 1939 (61,395 valued at $13,506,900); nearly 25 per cent. of the wired homes now possess refrigerators. Sales of ranges were valued at $4,761,615 (26,066 units); washers at $6,288,513 (81,669 units); vacuum cleaners at $3,713,430 (79,775 units); and ironers at $539,499 (6,526 units).

Munitions Production Speed-up

A conference was held on July 8th, at the Ministry of Supply, between the Minister and managing directors and other leading executives of concerns on war contracts. Among the matters touched upon were plans for rationalisation of production of certain essential items, simplification of procedure in ordering, new methods for ensuring the discovery and full use of spare capacity, employment of substitute materials, closer consultation between manufacturers and the Ministry in working out new specifications, and further relaxation of inspection.

Mr. Morrison undertook to have every new suggestion examined, and in some cases he was able to assure the conference that steps had already been taken to give effect to the ideas put forward.

"The Young Idea"

In addition to regular demonstrations for the benefit of married women, Mr. R. H. Harral, borough electrical engineer, Blackburn, has hit upon the happy idea of catering for the young people, and on June 20th 300 girls from various schools in Blackburn attended an all-electric demonstration given by Miss Sanderson in the lecture hall attached to the showrooms in Darwen Street. Many of the children are already accustomed to the benefits of electricity through modern appliances in their own school. On the following day Miss Sanderson had a similar gathering of teachers from the day schools.

Trade with South America

A noteworthy contribution to the stimulation of trade with South America is made by the July issue of the *British Export Journal*. The principal feature is a number of illustrated articles in both English and Spanish covering such subjects as individual drives in textile mills, remote control in industry, industrial refrigerating plant and boilers. The *Export Trader* section includes articles on British cars, motor cycles and cycles suitable for overseas markets, and there is a special supplement containing a history of the British Cycle and Motor Cycle Manufacturers' and Traders' Union.

All-electric Colliery

A new all-electric pit is being sunk in Scotland. Electrical plant will be employed exclusively for the coal seams and the latest coal-cutting and haulage plant is to be installed. The coal will be drawn to the surface by means of electrical endless haulage. Modern methods of dealing with the coal when it reaches the surface have been

provided. The plans include screening plant to deal with six different sizes of coal; crusher, hoppers and loading apparatus.

In connection with the enterprise, an adjoining farmstead has been acquired. The buildings have been converted into offices, power - house, workshops and weighing house.

Import Orders

The Imports Duties & Exemptions (No. 7) Order, 1940, which came into force on July 8th, adds to the free list machinery, including machine tools, aeroplanes and seaplanes, ball and roller bearings, ploughs and machinery belting. Exceptions to the order include telegraph and telephone apparatus, and electric bell and electric cooking apparatus. Another Order exempts any component parts of such free-listed machinery from Key Industry Duty.

Trading with the Enemy

The Board of Trade has issued the Trading with the Enemy (Specified Persons) (Amendment) (No. 7) Order, which contains a further list of German and Italian concerns, connections and agents in various parts of the world with whom commercial relations are now forbidden (Stationery Office, 3d.).

Leicestershire Electrical Development Circle

The Leicestershire and Warwickshire Electrical Development Circle has forwarded £120 to the Chancellor of the Exchequer to be utilised by the country for the duration of the war, free of interest. This represents practically the entire surplus funds of the Circle.

The International Electrotechnical Vocabulary

The International Electrotechnical Vocabulary which was first printed in France and published in June, 1939 (but in insufficient quantity to meet the demand), has been reprinted in Great Britain. The Vocabulary is in fourteen sections. Definitions are given in English and French, and the terms are given also in German, Italian, Spanish and Esperanto. An index in the six languages is included. Copies are obtainable at 12s. net from the British Standards Institution.

Arc Welding Amalgamation

The Quasi-Arc Co., Ltd., and the Ferro-Arc Welding Co., Ltd., have amalgamated under the name of the Quasi-Arc Co., Ltd., as from May 1st, 1940.

Technical Teachers and the Call-up

With the raising of the age of reservation to 30, teachers holding a first- or second-class honours degree in physics, chemistry, mathematics, engineering or metallurgy, who are liable to be called up for military service on or after August 1st, are asked to communicate with the Ministry of Labour's Central Register, if they have not already been accepted for that register, with a view to their services being considered for technical work of national importance.

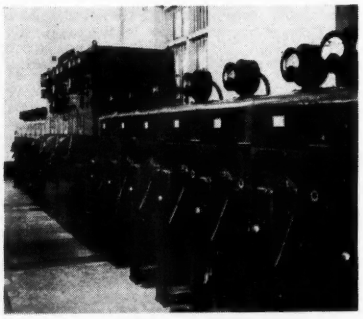
Indian Textile Mill Change-over

The owners of the New Pralhad Mill, Bombay, recently planned additions to the machinery with which the existing power plant would be unable to cope. Power had been supplied since 1902 by a Hick, Hargreaves two-cylinder horizontal cross-compound steam engine. It was decided to convert the entire mill to electricity, and the contract for the conversion was entrusted to Crompton Parkinson, Ltd. Power supply is from the Tata Electric Power Co. at 22 kV. The present demand is about 4½ million kWh a year.

The order placed with Crompton Parkinson, Ltd., at the end of February covered the whole of the work, including substation equipment, cables, motors, control gear, mechanical drives, and power factor equipment. Although the scheme includes six motors of 175 HP, which could conveniently have been supplied at 2,200 V, distribution is at 400 V throughout because any future extensions would be most easily dealt with at this voltage. In addition, a single voltage system gives greater flexibility and enables 50 per cent. transformer standby capacity to be provided without installing more than three transformers.

The substation is equipped with three 1,000-kVA B.E.T. 22,000/400-V transformers, supply being taken from the Supply Co.'s circuit-breakers to an overhead busbar system and air-break isolating switches. The whole of the low-voltage equipment is ironclad, and the transformers are connected to their l.v. cubicles by two single-core, 1-sq. in., paper-insulated, lead-covered cables per phase. The main l.v. switchboard comprises 17 units, i.e., three transformer cubicles and 14 "Klad A" units, three controlling 850 kVA of condensers, ten controlling outgoing feeders and one with separate metering for the lighting system. Nearly two miles of cable were laid to connect the substation to the distribution boards in the various departments.

Lineshafts are driven by screen-protected or pipe-ventilated motors depending on their situation, and for motors up to 40 HP "Tork" pattern machines are employed. The 29 cross shafts in the loom sheds are each driven by one motor, 19-20 HP and 10-16 HP motors being installed. The four calenders are driven by variable speed slip-ring motors through Fenner "V" rope drives, and are operated by drum controllers. The three compressors have similar drives from constant speed slip-ring motors.



Crompton Parkinson l.v. switchboard in the substation of an Indian textile mill

The main group drives in the carding, raising and ring spinning departments and in the blowroom are by slip-ring motors driving through Renold and Coventry bush roller chains of which there are 51. Altogether 70 motors totalling 2,600 HP are installed.

The whole installation was carried out without interfering with production.

London J.E.A. Returns

As foreshadowed in our issue of June 28th the headquarters staff of the London and Home Counties Joint Electricity Authority is returning from Burford to London. As from to-day (Friday) the Authority's address will again be 5-6, Lancaster Place, Strand, W.C.2.

New Offices for Crompton Parkinson

Crompton Parkinson, Ltd., inform us that they are leaving their offices at Bush House, London, which they have occupied for the last twelve years. New premises have been taken on the Victoria Embankment and will be occupied on July 15th. Their new address will be Electra House, Victoria Embankment, W.C.2, the telephone number remaining Temple Bar 5911, while Temple Bar 1146-7 will continue to be used by their associate company, the Atlas Sprinkler Co., Ltd., which is also transferring. The move necessitates an alteration in telegraphic addresses, Crompton Parkinson, Ltd., becoming Crompark, Estrand, London, while that of the British Electric Transformer Co. Ltd., will become Transfundo, Estrand, London. That of the Atlas Sprinkler Co., Ltd., will remain as hitherto.

A.R.P. Training Instructions

In response to a suggestion from many quarters that it would be convenient if a single publication could be compiled which would include changes in A.R.P. training instructions issued in recent months, a Training Bulletin has been prepared by the Ministry of Home Security. It is hoped that a Bulletin of this nature will be of value to instructors in the employ of local authorities, and industrial or commercial concerns. Further Training Bulletins will be issued from time to time as sufficient new material becomes available. To make sure of obtaining future copies under present conditions, a standing order should be placed with the Stationery Office.

Institute of Transport Examinations

The Institute of Transport announces that, circumstances permitting, the next examination for Graduateship and associate membership will be held on May 5th, 6th and 7th, 1941, in London and at provincial and overseas centres. Full particulars of the examinations, previous question papers (price 1s. per set, post free) and copies of the booklet entitled "The Institute of Transport Examinations: Notes for the Guidance of Candidates Unable to Attend Preparatory Courses" (price 1s. 2d. post free) may be had on application to the Secretary, 15, Savoy Street, London, W.C.2. The closing date for the receipt of applications to sit for the examinations is March 31st, 1941.

Broadcast Music to Employees

The G.E.C. has installed a complete sound reproduction system at its Hammersmith factory, which not only provides music for relieving the monotony of tedious tasks, but also serves for an air-raid warning and control system throughout the factory and its shelters. The company has sent us particulars of this installation which includes data that should prove useful in applying a similar scheme to other cases in which it is justified.

Henley's Saving Association

For many years the Henley Savings Association, which embraces head office, works and branches, has been one of the strongest in the City of London. To mark National Savings Week the directors gave an excellent stimulus to the savings campaign among their employees by paying the final sixpence on every certificate purchased. From the beginning of Savings Week to the week ending June 28th a total of £8,413 was subscribed, representing 11,213 certificates and 1,172 subscribers.

Prices of Materials

Henry Gardner and Co., Ltd., report, July 10th: Mercury, £58 to £60. English block tin, £263 10s., 15s. increase.

Edward Till & Co. report, July 10th: India rubber, Para fine, 1s. 3d., ¼d. decrease.

Catalogues and Lists

Watson & Sons (Electro-Medical), Ltd., 76, Castle Street, Reading.—Illustrated 11-page brochure, 114-40, technically descriptive of portable X-ray apparatus, Type MX-1, designed to be dismantled for packing in carrying cases.

Partridge, Wilson & Co., Ltd., Davenset Works, Evington Valley Road, Leicester.—A descriptive leaflet relating to the Davenset automatic pump.

English Electric Co., Ltd., Stafford.—Leaflet W.93, dealing with Class LW fan-cooled squirrel-cage motors and 12-page technical brochure W72 on the use of Class LAS synchronous motors for power factor correction; both illustrated.

Morecambe Electrical Equipment Co., Ltd., Westgate Works, Morecambe.—Leaflet 22, relating to AC control gear.

Rhodes, Brydon and Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport.—List 715, describing the company's "Mopumps."

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.—Illustrated and priced leaflets descriptive of improved educational laboratory equipment, including the "Microid" lever balance, gas calorimeter, spherometer and brownian motion apparatus for use with microscopes.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

MEDIPHONE telephone instrument.

CRUISER handlamp.

A.B.C. electric washing machine (spare parts for).

MUNICIPAL REPORTS

Birmingham's Financial Strength. Load Factor and Lighting at Stoke

Leeds

IN his first annual report as city electrical engineer of Leeds, Mr. F. Nicholls has to record an apparent adverse balance on the year's working. The deficit is given as £29,287 as compared with a loss of £7,598 in the previous year, but this is after a net sum of £42,538 has been taken for capital expenditure out of revenue; omitting this, there was a net profit of £13,252 after providing £160,361 for loan debt reduction.

The abnormally severe weather in January and February is stated to have compensated in some degree for the earlier loss of sales through various wartime restrictions, and the net result was that an additional 7½ million kWh was sold, mainly to power and "residential bulk supply" consumers. There was, however, a big decrease in sales for private lighting, and the outcome was a fall in revenue from the sale of electricity of £9,000. Total income amounted to £1,068,845 (against £1,083,335), while expenditure rose from £729.997 to £768,775.

Excluding bulk supplies to other undertakings (6.9 million kWh), total sales amounted to 267.3 million kWh, an increase of 5.9 million kWh (2.3 per cent.). Power supplies advanced by nearly 9 per cent. to 124.7 million kWh, "residential bulk supplies" by 5 per cent. to 60.1 million kWh, and heating by 12½ per cent. to 10.6 million kWh. Against these increases, traction sales dropped by nearly 4 per cent. to 37.3 million kWh, private lighting by nearly 14 per cent. to 34.0 million kWh, and street lighting by 73 per cent. to 0.5 million kWh. The total number of consumers rose by 4,389 to 163,995. Apart from traction and bulk supply equipment, the capacity of apparatus connected on consumers' premises at March 31st was 496,310 kW, an increase of 27,603 kW.

Birmingham

In its annual trading report presented to the City Council last week the Birmingham Electric Supply Committee states that the quantity of electrical energy sold within the undertaking was 930.7 million kWh, an increase of 115.2 million kWh (14.1 per cent.) which, in the present difficult times, is regarded as very satisfactory. The Department, of which Mr. F. Forrest is chief engineer and manager, connected 18,422 new consumers during the year, making the total number 301,901. New load connected aggregated 115,941 kW, which raised the total to 1,228,464 kW. It is noted that credit sales business is still being conducted, in a modified form.

Revenue for the year was £3,379,086 and trading expenditure £2,486,369; with regard to the latter item it is pointed out that the advance in the price of coal over the average for 1935-36 has resulted in an additional cost to the Department for the year under review of approximately £290,000. On net revenue account there is a balance of £267,515. After deducting £163,567 for capital expenditure charged to net surplus and adding £100,665 brought forward from 1938-39 there is a balance to be carried forward of £204,613. Up to the end of March £19,803,578 had been raised in loans for the undertaking (£689,290 during the year under review) and £8,422,863 had been repaid.

In moving the adoption of the report, Alderman Sir Percival Bower, Kt., M.B.E., chairman of the Committee, said that if at all possible they wished to avoid increasing the electricity charges, and they therefore proposed to carry forward the surplus of £204,613 in order that they might be covered in case of exceptional emergency. Although a substantial part of the financial year had brought many difficulties, the undertaking had made all-round progress. It was interesting to note that during the past five years the sales had increased by 378 million kWh (69 per cent.), the number of consumers by 139,716 (86 per cent.), and the connected load by 634,000 kW (nearly 107 per cent.).

Not only had the undertaking continued its progressive development, he said, but its financial position was strong. Apart from the reserve fund they had repaid 42.5 per cent. of the total capital raised and, in addition, they had within a few years spent out of revenue for capital purposes £1,383,000, while over the past five years they had made reductions in charges amounting to £1,252,000.

Bristol

At Bristol, as at Leeds, there was a fall in the average price per kWh sold due to the reduction in lighting sales, the figure for last year being 0.864d. against 0.905d. With higher costs, this had the effect of reducing the gross profit from £397,597 to £338,368, and after providing for loan charges, &c., there was a deficiency on the year's trading of £23,828. Deducted from the carry forward of £114,184 from the previous year, this leaves £90,356, which is further reduced by £34,230 to meet the cost of domestic apparatus, wiring for appliances on hire, and other items of a capital nature, leaving £56,126 to be carried forward. Of this, £25,000 is to be reserved for equipment for the new offices and showrooms. Total income for the year was £1,267,657 (against £1,208,835), expenditure after the deduction of C.E.B. refund being £929,289 (£811,238).

Sales aggregated 331.0 million kWh, an increase of 30.7 million kWh (10.2 per cent.). Analysing these, Mr. A. J. Newman, the chief engineer and general manager, shows that, besides industrial supplies, those for cooking and heating, including domestic, were substantially greater than in 1938-39 (104.6 million kWh; 13½ per cent. increase). Supplies at power rates amounted to 26.6 million kWh (7 per cent. increase) and at combined rates 177.3 million kWh (15 per cent. increase). Lighting rate sales totalled 20.9 million kWh (12 per cent. decrease) and public lighting 1.7 million kWh (68½ per cent. decrease).

At the end of the year there were 18,876 cookers, 17,274 water heaters, 3,545 wash boilers, and 10,691 kettles in use. Over 33 miles of additional distributing mains were laid during the year and 6,053 more consumers were connected, making the total 116,523.

Belfast

In the field of domestic supplies, the Belfast Electricity Department has in recent years been doing good work, as was evidenced by the exceptional growth in sales during 1938-39 of 32 per cent. On top of this it was not to be expected that there would be a striking increase during the past year. There was, however, some further improvement, supplies of this character increasing by 2.1 million kWh (6 per cent.) to 35.8 million kWh. Mr. F. H. Whysall, the city electrical engineer and general manager, reports that the Department is continuing the hiring to consumers of cookers, wash boilers and storage heaters, and the hire purchase of immersion heaters, but the provision of electric lighting installations under the hire-purchase scheme has been discontinued for the war period.

The largest increase was in industrial supplies. On the other hand, there was a big drop in lighting sales (by 24 per cent. to 12.9 million kWh) and this had a serious effect on the Department's earnings.

Excluding bulk supplies of 49.2 million kWh, total sales were 158.1 million kWh, an increase of 7.1 per cent. An additional 5,682 consumers were connected during the year, making the total 81,658.

Revenue amounted to £750,930 (against £720,756), and working expenses were £402,509 (£359,592). The net profit was £36,465, as compared with £66,971 in the previous year. It is proposed to contribute £11,000 towards rate relief, although it has been deemed advisable to increase charges in order to meet the rise in working costs and "to provide a reasonable balance for transfer to the renewals and reserve accounts and also to devote to writing down of capital."

Stoke-on-Trent

The Stoke-on-Trent Department's report is presented by Mr. C. H. Yeaman, who recently retired, and in a footnote Mr. H. L. Mills (engineer) and Mr. T. Lockett (manager) pay a tribute to his excellent management and capabilities to which are ascribed in no small measure the successful results of the past difficult year.

Financially, the undertaking is in the position of being able to record an increase in income greater proportionally than the rise in expenditure. Total revenue was £513,201 (against £476,589) and expenditure £366,202 (£348,777), the gross profit rising by £19,187 to £146,998. Superannuation appears in the accounts for the first time and amounts to £3,526. After meeting various charges there is a net profit of £2,454, as compared with £5,307 in the previous year. This is transferred to reserve account, which, after meeting certain expenditure charged to this account, is reduced from £85,735 to £83,982.

In regard to sales, progress in recent years was maintained; 126.1 million kWh was supplied within the Department's area, an improvement of 10.3 per cent. A feature was the further expansion under the multi-part and all-in tariffs, supplies of this kind (20.9 million kWh) for the first time exceeding those for lighting (16.2 million kWh). It is observed that the drop in high-priced lighting sales meant a reduction in revenue of over £12,000, but this had repercussions in another direction by reducing the maximum load and thus improving load factor. It is shown that for last year the supply load factor was 44.16 per cent. compared with 36.66 per cent. in 1938-39, the m.d. falling from 37,570 to 34,400 kW. Consumers at the end of March last numbered 66,692 (including 219 air-raid shelters and sirens), an increase of 4,310. The number of cookers and grillers on hire at the end of the year was 11,401, an increase of 1,840, and the horse-power of motors connected rose by 2,494 to 39,314.

Carlisle

At Carlisle the major part of the growth in sales during the past year was obtained in the Department's extensive rural area, where supplies expanded by 31.0 per cent. to 8.4 million kWh. Supplies to farms, at 0.3 million kWh, show an improvement of 42 per cent., and domestic two-part tariff sales in the rural area rose by nearly 19 per cent. to 2.8 million kWh.

In regard to domestic supplies Mr. C. W. Salt, the city electrical engineer and manager, comments that the war affected the hire of appliances for a period, but good business could now be done, even though advertising and demonstration work have almost entirely been stopped, but the obscure future position regarding prices and delivery does not help matters.

Altogether the Department last year sold 32.8 million kWh, an increase of 8.6 per cent. There was a small loss on the year's working—£101—compared with a profit of £5,947 in the previous year. The average price obtained was 1.22d. against 1.26d.

Leigh

For the first time in the history of the Leigh (Lancs) Electricity Department the average revenue received per kWh sold has fallen below a penny (0.964d.). That this should have been accomplished with an increase in the net profit (from £5,384 to £7,053) is, as Mr. J. B. Hudson, the borough electrical engineer, points out, not unconnected with the Electricity Committee's general policy. Among other things it refrains from using the resources of the undertaking for rate aid. Another point of interest disclosed in the engineer's report is that the average cost per kWh sold (excluding interest charges, &c.) was reduced from 0.804d. to 0.738d., an unusual tendency at the present time. Sales of energy amounted to 21.4 million kWh, a rise of 18.4 per cent. An improvement in load factor from 30.55 to 35.40 per cent. is recorded.

ELECTRICITY SUPPLY

Rate-Aid Discussed at Coventry. Taunton Assessment Appeal

Aldershot. — HIGHER CHARGES. — The Council last week authorised increases in electricity charges. The lighting flat rate is being raised by ¼d. and the heating and cooking rate by a similar amount in the two winter quarters, the summer price remaining at ¾d. The domestic two-part tariff fixed charge is to be increased by 15 per cent., with no alteration in the running charge, while in the case of the business two-part tariff the fixed charge is not changed but the "unit" charge is raised from ⅝d. to ¾d. In reply to a question it was explained that the domestic tariff fixed charge was raised to avoid altering the meters, the electrical engineer (Mr. L. W. George) pointing out that the number of prepayment meters on the system was 1,500, compared with about 800 ordinary meters.

Bacup.—RATE AID.—A profit of £3,366 on the year's working of the electricity undertaking was reported by Alderman Ireland (chairman, Electricity Committee) on July 4th. He said that a sum of £1,230 was being transferred to the rates.

Barnoldswick.—EQUAL VOTE ON SALE OF UNDERTAKING.—At a meeting of the U.D.C. on July 3rd Electrical Distribution of Yorkshire, Ltd., renewed its offer to purchase the Council's electricity undertaking. On a resolution that the offer should be accepted the voting was equal, and as the chairman declined to give a casting vote the motion fell. It was stated that the Company was prepared to make a goodwill payment of £15,000 and to pay outstanding liabilities in full.

Barrow-in-Furness. — CHANGE-OVER. — The Electricity Committee has obtained sanction to borrow £5,200 for mains and services for the change-over in the Vickerstown district.

Birkenhead. — LOAN FOR EQUIPMENT.— The Electricity Committee is applying for permission to borrow £2,000 for consumers' apparatus.

Blackburn. — SUPPLY SCHEMES. — The Town Council on July 4th agreed to a supply being given to the Saw Mill, Great Harwood at a cost of £3,339. It also approved an expenditure of £146 for supplying electricity to an electrode boiler at Woolly Mill, Blackburn.

Clacton-on-Sea. — AIR-RAID SHELTER INSTALLATIONS.—At its meeting last week the U.D.C. decided to install electric lighting from the mains in all public air-raid shelters in the town. It was stated that Essex County Council had refused to sanction the work, but the U.D.C. undertook to bear the responsibility and pay for the installations.

Colchester.—RESULT OF YEAR'S WORKING.—It was reported at the July meeting of the Town Council that the net result of the year's working of the Electricity Supply Department was a deficit of £7,816 as compared with a deficit in 1938-39 of £6,066. The borough electrical engineer (Mr. G. P. Dixon) said that the year included five months of peace, during which the output increased by 14.7 per cent., but the total output for the whole year increased by only 8.2 per cent. Lighting sales did not show the heavy fall anticipated in the early months of the war, power sales increased by 14.4 per cent., and domestic tariff sales showed about half the normal increase. Trading activities held up better than anticipated. Alderman Owen Ward, chairman of the Committee, said the deficit was due partly to the restricted use of electricity and the "staggering" increases in the price of coal and other materials.

Coventry.—RATE AID OPPOSED.—When it was reported to the City Council that the electricity undertaking had made a net profit of £58,759 for the past year, Councillor Payne asked whether it would not be possible to utilise some of the profit for rate relief. If this were not practicable a central fund should be formed from the profits of the various undertakings with a view to assisting the municipality. Alderman T. J. Harris retorted that this old idea had been seriously detrimental to the city in the past and was responsible for the present situation of the gas undertaking.

Dundee.—REDUCED MAXIMUM DEMAND. The Electricity Department's accounts for the past year show a surplus of £22,000 which is transferred to reserve. Sales exceeded 85 million kWh, an increase of over 5 million kWh. Commenting on the report the treasurer said that the stopping of public lighting and window display lighting, combined with economy by domestic consumers, resulted in a large reduction in maximum demand, and this in turn meant a reduction in payment to the Central Electricity Board. They had happily avoided the necessity for increasing the electricity charges.

Hull.—LOAN SANCTIONS.—The Electricity Committee has obtained sanction to borrow £4,200 for mains.

Lichfield. — SUPPLY EXTENSIONS.—For supplying electricity to Fradley and to the Ponesfield housing estate the Council has obtained sanction to borrow £3,464.

Manchester.—WATERWORKS CHANGE TO PUBLIC SUPPLY.—In the annual report of the Manchester Corporation Waterworks Committee it is stated that the change-over from private electricity generation to public supply is proceeding satisfactorily. Work is still continuing on the rewiring and improvement of various electrical installations.

Milford Haven.—SUPPLY TO HOUSING ESTATE.—The U.D.C. is to submit to the Electricity Commissioners proposals for AC mains and a substation at an estimated cost of £3,500.

Sheffield.—PRICE INCREASE REFERRED BACK.—In our last issue we reported that electricity charges were to be increased by 10 per cent. from July 1st. The Electricity Committee's unanimous recommendation to this effect was, however, referred back for further consideration at last week's meeting of the City Council. Alderman E. Wilson, who seconded the amendment for the reference back of the recommendation, said it did not appear to him that the Council had sufficient evidence before it to show that the profit of £199,000 for the year ended March 31st last would be absorbed by increased costs to the Department. Pending that information there should be postponement of the higher charges plan. Councillor J. Whittington, chairman of the Electricity Committee, in agreeing to the matter being deferred to the August meeting of the Council, said that the Department's costs had increased not by 10 per cent. but by 25 per cent. It would take them all their time to come out on the right side with a 10 per cent. increase.

South-West Midlands.—ABOLITION OF ADVISORY JOINT COMMITTEE. — The South-West Midlands Electricity District (Amendment) Order, 1940, made by the Electricity Commissioners and confirmed by the Minister of Transport, has now been published (H.M. Stationery Office, 1d.). The purpose of the Order is to wind up the South-West Midlands Advisory Joint Committee in view of the changed circumstances in the Electricity District.

Stalybridge.—GRANTS TO CONSTITUENT AUTHORITIES.—The Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board has approved a grant of £2,000 to each of its constituent authorities in relief of their rates. Last year the amount allocated to each was £2,500.

Stockton-on-Tees.—ELECTRICITY PROFIT. —The electricity undertaking earned a net surplus of £8,537 during the year ended March 31st.

Stoke-on-Trent. — ELECTRIC VEHICLE TARIFF.—The City Council has approved a recommendation that a flat rate unrestricted hour tariff of ⅝d. per kWh, plus the general advance of 10 per cent., shall be introduced for electric vehicle charging. This is subject to the tariff cash discount of 5 per cent.

Taunton. — APPEAL AGAINST ASSESSMENT.—At the last meeting of Somerset County Council the Assessment Committee reported that the Corporation had lodged notices of appeal to Quarter Sessions against the Committee's decision to confirm the assessment of the electricity undertaking at £4,167 rateable for the period commencing April 1st, 1939, and at the reduced figure of £3,334 for the period commencing October 1st, 1939. Subsequently the Corporation suggested that the matter should be referred to arbitration, and the hearing had been fixed for July 16th.

Torquay.—LOAN SANCTION.—The Electricity Committee has obtained sanction to borrow £5,742 for mains and services.

Tow Law (Co. Durham).—GASWORKS TO BE CLOSED.—The U.D.C. has decided to inform all gas consumers that the gasworks will be closed as from September 30th and that arrangements are being made to secure increased supplies of electricity.

Walsall.—DEPARTMENT'S PROFIT.—The Electricity Department reports a profit of £31,578 for the year ended March 31st last.

Watford. — NEW SWITCHGEAR. — The Electricity Committee has obtained sanction to borrow £8,000 for additional switchgear in the main switch-house and alterations to existing switchgear.

Winchester.—BULK SUPPLY ARRANGEMENTS.—The Electricity Committee has approved an estimate of the capital expenditure involved in laying an 11-kV cable. The work is to be carried out in order to transfer the rural supply to the C.E.B., and the cost was reported to be **£2,836, or £3,199 with apparatus.**

(*Continued on page* 37)

Birmingham and the C.E.B.

Increased Constructional Costs

AT last week's meeting of the Birmingham City Council Alderman Sir Percival Bower, chairman of the Electric Supply Committee, moved a resolution authorising the Committee to apply to the Electricity Commissioners for sanction to borrow further amounts in connection with the erection of the first and second sections of the Ham's Hall "B" power station. The additional expenditure was put at a maximum of £510,000.

Explaining the reasons for the resolution, Sir Percival Bower said that it was in 1935 that the Central Electricity Board was strongly urged to agree to the erection of the station in order to have it in commission by 1938. Had they been operating independently of the Board he had no doubt that the station would have been ready by then. Unfortunately the Board would not agree and it was not until February, 1938, that the Committee was able to ask the City Council for authority to proceed.

This unfortunate delay on the part of the Central Board had meant that they had been thrust into the war period with increased costs. When this became apparent the Committee at once advised the Board that the City Council could not accept the responsibility for the increased cost and that it must be excluded from future computations of the cost of the station when determining what its cost would have been under independent operation. The Central Board had accepted the principle that the additional capital expenditure attributable to the outbreak of war in respect of that section of the station assumed to have been in commission had the Committee proceeded when it wanted to, should be excluded from future computations of the cost of the station under independent operation, so that only a small part of the additional cost would fall upon the Department.

The City Council approved the resolution.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

3754. "Method for producing and activating a photo-electric structure." Radioakt. Ges. D. S. Loewe. February 8th, 1937 (Addition to 499744). (522245.)

21232. "Cathode-ray tube, more particularly for projection purposes." Radioakt. Ges. D. S. Loewe. July 24th. (522195.)

22458. "Tripping devices for electric circuit-breakers and switches." G. S. Marston and J. G. Statter and Co., Ltd. June 8th, 1939. (522303.)

26052. "Selective switches such as are used in automatic telephone systems." Standard Telephones and Cables, Ltd. (G. Deakin and Bell Telephone Manufacturing Co., Soc. Anon). September 6th, 1938 (Cognate application 3307/39). (522198.)

31660. "Electric switches and plug-and-socket connections." C. H. Parsons, Ltd., and G. B. Handley. November 2nd, 1938. (522147.)

32257. "Bearings for electric motors." Scophony, Ltd., and G. Wikkenhauser. November 7th, 1938 (Cognate application 36799/38). (522200.)

35028. "Electric motor control systems." British Thomson-Houston Co., Ltd. December 1st, 1937. (522203.)

35109. "Clip for operatively suspending articles in electroplating and like mechanism." C. F. Neale, J. Kronsbein and A. D. Weill. December 2nd, 1938. (522156.)

35165. "Time-base circuits." Kolster-Brandes, Ltd., C. N. Smyth and D. S. B. Shannon. (522165.)

35251. "Brushgear of electrical machines." C. H. Tobin. December 3rd, 1938. (522255.)

35295. "Brush holders for electrical machinery." Morgan Crucible Co., Ltd., and C. J. Hews. December 3rd, 1938. (522257.)

35338. "Electrical potential controlling devices with particular reference to the speed control of electric motors in follow-up control systems." G. W. Braham. December 5th, 1938. (522267.)

35369. "Telephone systems." Siemens Bros. and Co., Ltd., and B. A. Hensler. December 5th, 1938. (522273.)

35379. "Electrical remote-control or signalling systems." Sangamo Weston, Ltd., G. Gilliver and G. F. Tagg. December 5th, 1938 (Cognate application 9279/39). (522275.)

35387. "Electrical measuring instruments." General Electric Co., Ltd., H. C. Turner and G. M. Tomlin. December 5th, 1938. (522276.)

35394. "Control of electrically driven steel-working machines." British Thomson-Houston Co., Ltd. December 4th, 1937. (522277.)

35395. "Control systems for electric winders, haulages, and the like." British Thomson-Houston Co., Ltd., and H. W. C. Liddiard. December 5th, 1938. (522278.)

35584. "Liquid break electric circuit-breakers." British Thomson-Houston Co., Ltd., and H. Trencham. December 6th, 1938. (522369.)

35592. "Electrode for arc welding." A. Nepoti. December 14th, 1937. (522370.)

35595. "Regulating mechanisms for projection arc lamps." Zeiss Ikon A.-G. Ges. January 29th, 1938. (522371.)

35633. "Focusing systems for electron beams." Ferranti, Ltd., M. K. Taylor and H. Wood. December 7th, 1938. (522377.)

35685. "Thermionic amplifiers." General Electric Co., Ltd., D. C. Espley and G. W. Edwards. December 7th, 1938. (522387.)

35686. "Systems for receiving high-frequency carrier signals." General Electric Co., Ltd., L. C. Stenning and R. W. White. December 7th, 1938. (522388.)

35721. "Actuation of switch mechanisms by automatic means, such as floats." R. Trist and Co., Ltd., and W. A. Chambers. December 7th, 1938. (Cognate application 10156/39.) (522211.)

35738. "Electric circuit-breakers." British Thomson-Houston Co., Ltd., H. E. Cox, and A. C. Gicson. December 7th, 1938. (522290.)

35739. "Air-break electric circuit-breakers." British Thomson-Houston Co., Ltd., H. E. Cox, and A. C. Gicson. December 7th, 1938. (522291.)

35793. "Instrument for use in measuring the intensity of ultra-violet radiation." A. M. Taylor and N. Allday. December 8th, 1938. (522402.)

35795. "Surface treatment of aluminium and aluminium alloys, and the after-treatment of anodic films thereon." British Aluminium Co., Ltd., and A. N. D. Pullen. December 8th, 1938 (Cognate application 10252/39). (522214.)

35845. "Manufacture of vitreous envelopes, for example, of cathode-ray tubes through which leading-in wires pass." General Electric Co., Ltd., J. Richards and G. W. Warren. December 8th, 1938. (522217.)

35967. "Telephone transmitters." Standard Telephones and Cables, Ltd. (F. G. Friebel). December 9th, 1938. (522226.)

35968. "Laminated magnetic cores." Kolster-Brandes, Ltd., and D. S. B. Shannon. December 9th, 1938. (522227.)

36026. "Apparatus for separating magnetic particles from fluids." A. M. Armour and Metropolitan-Vickers Electrical Co., Ltd. December 9th, 1938. (522294.)

36048. "Electrode arrangements employed in electron-discharge devices." O. Klemperer. December 10th, 1938. (522317.)

36074. "Electrical switches of the oscillatory-contact type." J. A. Crabtree and Co., Ltd., H. F. McLoughlin and W. E. Hill. December 10th, 1938 (522318.)

36078. "Connecting or contact strips for attachment to a supporting base." Plessey Co., Ltd., and F. G. Gillard. December 10th, 1938. (522233.)

1939

433. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 8th, 1938. (522238.)

504. "Rectifier equipment." British Thomson-Houston Co., Ltd. January 8th, 1938. (522329.)

698. "Electric incandescent lamps and the mounting thereof." British Thomson-Houston Co., Ltd. January 8th, 1938. (522342.)

4122. "Electric stop-motions for textile machinery." Howard and Bullough, Ltd., and E. J. Airey. February 8th, 1939. (522408.)

5156. "Leader-gear equipment, particularly for the blind landing of aircraft." E. N. Dungley, jun. February 21st, 1938 (Cognate application 5157/39). (522345.)

8553. "Electric control device." Stackpole Carbon Co. March 21st, 1938. (522348.)

Electricity Supply (*Continued*)

Worthing.—MAINS AND SERVICES.—Sanction has been obtained to borrow £4,000 for mains and services.

RESULT OF YEAR'S WORKING.—The Electricity Committee reports a net profit of £4,163 for the past year.

York.—DEPARTMENT'S PROFIT.—It was reported to the City Council at its last meeting that the Electricity Department's net profit for the past year was £11,314, as compared with £24,000 in the previous year.

Overseas

Abyssinia. — HYDRO-ELECTRIC PLANT.—The Italian journal *Elettrotechnica* reports that a small hydro-electric plant has recently been completed near Addis Ababa to supply power to the city and district. The plant, which utilises the power of the River Grande Akaki and was constructed by the Societa San Giorgio, of Genoa, comprises two 1,250-kW, 3,000-V turbines and generators, a third set of 530 kW capacity and three 3/45-kV transformers.

Australia.—POWER SCHEMES.—Our Perth correspondent reports that at a recent special meeting of the Wagin (W.A.) Municipal Council specifications for new plant which it is proposed to install at the local power house at a cost of about £1,000 were considered. The plant will comprise a Diesel unit to take the night load which is at present carried by storage batteries. A new Diesel-operated electricity station at Boulder was recently officially opened. The scheme has cost approximately £22,000. Further additions to the Bunnerong power station (N.S.W.) are expected to cost some £472,000. It has been stated that if, as many would prefer, Pyrmont were chosen for further extensions, the total cost would be nearer £1,500,000. Shipment of the second 50,000-kW turbo-alternator was delayed owing to war conditions, but its installation should provide for the Council's requirements until 1943.

India.—ELECTRICAL PLANT INAUGURATED.—An electrical system at Puri, Orissa, was recently inaugurated by Sir John Hubback (Governor). At the power house His Excellency switched on the installation and a tablet commemorating the ceremony was unveiled on the switchboard.

TRANSPORT

Cardiff. — TRANSPORT DEPARTMENT'S PROFIT.—The Transport Committee reports a net profit for the year of £23,376 (£10,524 on the tramways).

Dundee.—TRADING PROFIT.—There was a surplus of £13,300 on the working of the Transport Department for the past year, including a profit of £10,300 on the tram system.

London.—ELECTRIFICATION POSTPONED.—It is reported that the electrication of the G.W.R. line to Ruislip and the eastward extension of the London Passenger Transport Board's Central Line are to be discontinued for the duration of the war.

Newcastle-on-Tyne.—REQUEST FOR TRAMWAY EXTENSION.—The City Housing Committee last week agreed to ask the Transport and Electricity Committee to extend the tram service from Four Road Ends at Benton to the loop adjoining the new Longbenton estate.

South Shields.—LOAN FOR TROLLEY-BUS ROUTE EXTENSION.—Application is to be made to the Ministry of Transport by the Town Council for permission to borrow £1,600 in connection with the trolley-bus route extension from the junction of Redwell Lane and the Coast Road to Marsden Grotto.

West Hartlepool.—TROLLEY-BUS DEFICIT.—The Corporation's trolley-bus service operated with a deficit of £1,278 for the year ended March 31st last, compared with a net profit of £378 in the previous year.

Mining Engineer's Fatal Shock

AN inquest was held at Lancing recently on Arthur Geoffrey Faithfull, aged thirty-five, a mining engineer, who met his death while carrying out an electrical repair in the loft at his home. Mr. E. A. Faithfull, retired Assistant Director-General, G.P.O., India, said that his son had considerable experience with electricity in connection with his profession. He thought the fatality must have occurred through his son forgetting to switch off at the main before starting work on the cable.

Mr. W. L. Cox, an electrical engineer employed by the Shoreham Electric Light & Power Co., said there were some bare wires which showed signs of burning.

A verdict of "Accidental death" was recorded.

D

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

Quadrant Engineering Co., Ltd.—Private company. Registered July 5th. Capital, £100. Objects: To carry on the business of dealers in machinery tools, electrical, mechanical, optical and scientific instruments, mechanical and electrical engineers, founders, &c. The permanent directors are E. Greetham, 17, Allingham Court, Haverstock Hill, N.W.3, and A. E. F. Thomas, address not stated.

Rocco Products, Ltd.—Private company. Registered July 6th. Capital, £1,000. Objects: To construct, equip, carry on and develop works of a public or semi-public character, or of public utility, and to carry on the business of civil, mechanical, electrical and general engineers, metal and alloy makers and workers, &c. The subscribers are: H. M. W. Royce, 16, Ealing Court, Withington Road, Manchester, 16, and J. A. Rhodes, 559, King's Road, Stretford, Manchester. Secretary: J. A. Blount. Registered office: Century House, St. Peter's Square, Manchester, 2.

Companies' Returns

Statements of Capital

D.P. Battery Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 10th. All shares taken up. £28,000 paid. £72,000 considered as paid. Mortgages and charges, nil.

Requirements Electrical & Engineering, Ltd.—Capital, £500 in £1 shares. Return dated April 17th. 303 shares taken up. £203 paid. £100 considered as paid. Mortgages and charges, nil.

Marconi Sounding Device Co., Ltd.—Capital, £75,000 in £1 shares. Return dated May 13th. All shares taken up. £75,000 paid. Mortgages and charges, nil.

Scammell Electric Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 8th, 1939 (filed May 28th, 1940). 700 shares taken up. £700 paid. Mortgages and charges, nil.

Power Specialities, Ltd. — Capital, £5,000 in £1 shares. Return dated February 8th. 4,270 shares taken up. £3,490 paid. £780 considered as paid. Mortgages and charges £5,000.

Giles (Electrical Engineers), Ltd.—Capital, £1,500 in 1,000 preference and 500 ordinary shares of £1. Return dated December 30th, 1939 (filed May 29th, 1940). 230 preference and 500 ordinary shares taken up. £481 paid on 230 preference and 251 ordinary shares. £249 considered as paid on 249 ordinary shares. Mortgages and charges nil.

Pan-Electric, Ltd.—Capital, £200 in £1 shares. Return dated May 15th. All shares taken up. £196 paid. £4 considered as paid. Mortgages and charges nil.

Robson & Coleman, Ltd.—Capital, £3,500 in £1 shares. Return dated May 28th, 1940. 2,191 shares taken up. £1,835 paid. £356 considered as paid. Mortgages and charges nil.

Rudkin, Hallewell, Ltd. — Capital, £2,500 in £1 shares. Return dated May 14th. 2,226 shares taken up. £2,226 paid. Mortgages and charges nil.

Mortgages and Charges

F. Fradley, Ltd.—Debenture, charged on the company's undertaking and property, including uncalled capital, dated June 11th, 1940, to secure £676 8s. 7d. Holder: Mrs. E. J. Fradley, 119, John Street, Biddulph, Staffs.

N. Darbyshire & Co., Ltd.—Debenture, charged on the company's property, present and future, including uncalled capital, dated June 18th, 1940, to secure £140. Holder: Norman Darbyshire, 1a, Parrswood Court, Didsbury, Manchester.

Synchronome Co., Ltd.—Issue on June 26th, 1940, of £3,500 debentures, part of a series already registered.

Euston Manufacturing Co., Ltd.—Issue on May 30th, 1940, of £200 debentures, part of a series already registered.

Grimston Electric Tools, Ltd.—Particulars filed of £1,000 debentures authorised June 18th, 1940, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued. The above debentures rank after debentures issued on March 11th, 1932, July 3rd, 1933, and July 18th, 1938.

Newman & Watson, Ltd.—Mortgage dated January 1st, 1934, charged on 47, Cleveland Avenue, Scalby, Yorks (being property acquired by the company on April 29th, 1940). Amount owing, £636 10s. Registered pursuant to Section 81 of the Companies Act, 1929. Mortgagees: Scarborough Building Society.

Receiver Appointed

Euston Manufacturing Co., Ltd.—G. G. P. Goldney, of 57, Gracechurch Street, E.C., was appointed receiver and manager on June 27th, 1940, under powers contained in debentures dated January 24th, February 29th, and May 30th, 1940.

Increases of Capital

Mawdsley's, Ltd.—The nominal capital has been increased by the addition of £25,000 in £1 ordinary shares beyond the registered capital of £50,000.

Dean & Noble, Ltd.—The nominal capital has been increased by the addition of £4,000 beyond the registered capital of £1,000. The additional capital is divided into 4,000 unclassified shares of £1 each.

Company Liquidations

Page & Miles, Ltd.—Particulars of claims by July 29th to the liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, E.C.2.

Horsham Relay Service, Ltd.—Meeting under Section 236 of the Companies Act, 1929, to receive an account of the winding-up by the liquidator, Mr. C. M. Duncan.

Bankruptcy Proceedings

H. A. Tutte, electrical engineer, 32, Merry Hill Road, Bushey, Herts.—First meeting July 12th at 29, Russell Square, London, W.C.1. Public examination September 18th at the Court House, St. Albans.

T. Johnson (Tom Johnson & Co.), mechanical and electrical engineers and contractors, 233, The Wheel, Ecclesfield, lately trading at 25, Granville Street, Sheffield.—Public examination July 18th at the County Court Hall, Sheffield.

J. C. De Wardt (De Wardt Radio), radio and electrical engineer, 10, Windmill Street, Gravesend.—Third and final dividend of 1s. 4d. in the £, payable July 15th at 3, Warwick Court, Gray's Inn, London, W.C.1.

H. Atterby, electrician, 11, Andrew Road, South Ferriby, Barton-on-Humber, lately residing and carrying on business at 1, Ash Tree Avenue, Great Grimsby, as an electrical contractor.—First and final dividend of 1s. 8½d. in the £, payable July 12th, at 8, Flottergate, Great Grimsby.

Reports and Dividends

The General Electric Co., Ltd., reports profits for the year ended March 31st of £1,892,944, as compared with £1,776,099 for the preceding year, to which is added £807,220 brought in, making £2,700,214. From this the following deductions are made:—Depreciation, £395,442; special depreciation, £100,000; directors' fees, £5,052; pension fund, £62,343; dividends on the "A" and "B" preference stock, £160,650; income tax reserve, £540,000; general reserve £100,000. The dividend for the year on the ordinary stock is again 10 per cent., less tax, and the bonus of 10 per cent., less tax, is repeated, leaving a balance to be carried forward of £811,931.

The report states that the company's works have been employed to the utmost capacity. Their output has been largely for Government work, especially during the latter months of the year, while they have continued to give every possible preference to export. The research laboratories have also maintained their close co-operation with the various Government Departments.

Export business, though slightly below last year's record figure, has continued in spite of all difficulties at a satisfactory level. The company has been able to maintain a good supply to all its available overseas markets. The trading of its overseas companies has shown very satisfactory results—only in China and France have conditions made trading unprofitable. Pursuing the policy announced in last year's report, considerable manufacturing facilities have been acquired in Australia, and, to some extent, also in India and New Zealand.

The number of employees at March 31st was 42,415, an increase of nearly 3,000 on the previous year. In addition, 3,000 employees are serving with the Forces, all of whom are receiving an adequate allowance from the company. Meeting: July 18th.

The Revo Electric Co., Ltd.—Presiding at the annual meeting held on July 4th, Mr. B. Silcock (chairman) said that for the first six months of the year under review the company's trading was satisfactory, but with the advent of the war it became clear that they would have to face a transition stage in the nature of their products. As a result, production decreased in their standard lines of domestic appliances and street lighting, and capital expenditure increased owing to the necessity of purchasing new plant in order to cope with the changing nature of the business. They had also to face rising costs of labour and material, and in the circumstances the directors were unable to recommend a final dividend. In view of the heavy programme before them the necessity for the conservation of their liquid resources became of vital importance. They would, however, review the position again in September.

It was probable that during the current period the output from the factory would be as large as, if not larger than, that of last year, a great deal depending on the course of events and their ability to obtain necessary materials and labour.

The British Electric Traction Co., Ltd., held its annual meeting on July 5th, when Mr. J. S. Austen (chairman), who presided, said that when the company had to pay 100 per cent. E.P.T., it would be in a position to pay a dividend of 45 per cent. The deferred stock was now really in the position of a preferred ordinary stock which was entitled to receive 45 per cent., after which the Government took the balance. If the 100 per cent. tax had operated in respect of the past year they would have been able to pay the deferred stockholders 45 per cent., as they were doing, and there would have been £80,000 to go to the Government in E.P.T. That meant that their profits would have to fall to the extent of £80,000 before the dividend was affected.

The Anglo-Argentine Tramways Co., Ltd.—Meetings of the holders of the 4 per cent. first debenture stock, second debenture stock and income debenture stock were held on July 5th, at which the Duke of Atholl (chairman) said that the supplementary scheme, briefly summarised, meant for the stockholders, first, cancellation of the company's obligation to pay so many of the half-yearly interest instalments, as they fell due, on all stocks during the years 1940 and 1941, and possibly even 1942 and 1943, as the financial circumstances of the company rendered necessary; and, secondly, release of the company, during

(*Continued on page* 41.)

STOCKS AND SHARES

TUESDAY EVENING.

STOCK exchange markets, after the spasm of flatness which laid low so many prices a fortnight ago, have recovered a good deal of the losses in value, and, also, of the tranquillity which for a time seemed to have deserted the House. The issue of two-and-a-half per cent. National War Bonds at 100 is on "tap" for an indefinite period and into this channel will be directed for some time to come the greater part of funds which become available for investment. The recovery in prices has made substantial progress in outstanding cases, notably General Electric shares. On the other hand, some of the stocks to which minimum prices are applied have become extremely difficult to negotiate. British Government securities are upheld by the control which the Treasury exercises over the money market. Public business in stocks and shares fluctuates in volume rather erratically, which is not surprising in view of the forthcoming supplementary Budget and the hints circulated in advance as to a possible further increase in taxation.

The Attentive Investor

Investment of money in good class industrial shares goes on in quiet fashion day by day for the account of people to whom a higher rate of income than that afforded by British Government loans is essential for living purposes. Study of our weekly price-lists will show that even after the rise which has just occurred, shares in a number of good companies offer yields which range from 6 to 8 per cent. on the money. Such shares are attracting the attention of the investor who, having put as much money as he can spare into British funds, requires something else from which the income will help to raise the average return on his money.

After the Slump

The slump which occurred in prices a fortnight ago has had the effect of arousing a question as to whether any similar movement is likely to recur. If it is, runs the argument, the investor who has money in hand may do well to wait and see whether he can get in at cheaper levels than those which obtain to-day. The prospective buyer is not under compulsion as regards time, whereas for deceased accounts the necessity to realise is always present. The result is that, ordinarily, the supply of shares in quiet times tends to exceed the demand. But when prices descend to the slump values which ruled at the end of last month, it is always found that money becomes available to absorb stock offered at unduly depressed prices. It may be recalled that last month's flatness followed upon the desertion of this country by France, and the consequent nearer approach of invasion. From that blow, the Stock Exchange markets have recovered: they are hardly likely to be called upon to suffer any worse shock.

G.E.C.

General Electric Company has satisfied expectation by maintaining its previously paid dividend of 20 per cent. for the year ended March 31st last. The company's net profit is £116,000 up: the report and statement of accounts make excellent reading. As is well known, the company pays its ordinary dividend once a year. Some trepidation was felt in advance of the announcement lest the directors should feel themselves compelled to adopt an austere policy and, in the language of these times, to conserve the resources of the company. The latter are, however, sufficiently liquid and ample to justify the board in the dividend policy now pursued. From 55s., the shares have risen to 70s., at which the yield on the money, allowing for inclusion of the dividend, is nearly 6 per cent. The General Electric Company is of sufficiently commanding importance in the industrial world to make its example one that is likely to be observed by numbers of other undertakings, and, although the increased profits go largely in taxation, the repetition of the 20 per cent. dividend is a fine gesture of confidence.

Transport "C"

With last week's contention, based on available data, that London Passenger Transport "C" stock, at the then price of 25, held temptation to the speculator, that speculator evidently agreed, for the price has risen to 30. It cannot be said that the advance would give the previous buyer, at 25, a profit of 5 points, for the simple reason that the price of the stock is quoted in the market at so wide a margin that the middle prices are little more than guides. So narrow has the market in the stock become, and so erratic the supply and demand from the public, that Stock Exchange dealers have been quoting the price with a margin of 4 points between selling and buying. Transport "C" stock may be said to present scope for improvement at anything like the present figure. The four main-line railway companies will announce their interim dividend decisions on the 26th of this month, but whether the L.P.T.B. will add anything to these declarations is not known.

Controlled Prices

The senior and trustee stocks of the London Passenger Transport Board are governed by the minimum price regulations to which reference has been made here on several previous occasions. Owing to talk of air raids and of possible invasion, some of the stocks have become difficult to sell during the past few days. The 5 per cent. "B" stock, for instance, is quoted nominally at 104½ middle, but a holder who wished to sell found it difficult to realise his stock even at the minimum price of 102, below which no one is allowed to deal in the market. This serves as an illustration of the unexpected difficulties that can—and do—arise through the operation of controlled prices. Home Railway stocks are not subject to the plan, and violent fluctuations accordingly occur. Southern Railway 5 per cent. preference, after its drop of 40 points this year, has risen 7 on the week to 68½. The company's preferred ordinary at 47 shows a recovery of 9; the recent lowest price was about 35.

British Electric Traction

From its recent lowest price of 440, British Electric Traction deferred stock has recovered to 500, which is still 330 points below the peak reached during the past six months. The heavy slant is due to failure of the price to recover from the Treasury ban on new issues, combined with the effect of the now defunct Dividend Limitation Bill. So far as the first of these considerations is concerned, the board had anticipated the Government decision. As regards the dividend payment, the chairman said, at last week's annual meeting of the company, that the deferred stock is now really in the position of a preferred ordinary stock which is entitled to receive 45 per cent. After which the Government, he added, took the balance. To the holder of the deferred stock, this is a pleasing arrangement for, unless matters fall out unfavourably, the stock will command increased respect from the investor. At 500, the yield on a 45 per cent. dividend basis is 9 per cent. on the money. Were the stock to be split into £1 units, the chances are that it would become popular with the wide circle to whom the current quotation of 500 for £100 stock is something of a drawback.

Anglo-Argentine Trams

The Duke of Atholl had anything but a pleasant task in addressing, last Friday, the debenture stockholders in the Anglo-Argentine Tramways Company. Two years ago a scheme was formulated under which it was expected that all parties, including the Argentine Government, would fulfil what was known as the Transport Co-ordination Plan. Efforts to make definite progress have been met, said the Duke, "with a long succession of impediments arising from causes outside our control." The upshot of the matter is that the stockholders are asked to sanction a further two-year moratorium, with the possibility that they may be asked to cancel interest-payments during 1940 and 1941, and perhaps 1942 and 1943 as well. The meetings had to be adjourned to the 26th of this month because there were not the necessary quorums at last week's meeting, but the position is parlous and obscure. In the circumstances, it is not surprising that the 5½ per cent. first preferred shares of £5 each should have recently changed hands at a shilling each, and that the £100 4 per cent. income debentures should be quoted at about 70s.

Dividend Deferred

Hall Telephone Accessories (1928) announce that the directors have decided to defer consideration of the dividend until the accounts covering the full year are available. For 1939 the interim dividend was 5 per cent. and a final of the same amount made 10 per cent. for the year, as against 15 per cent. in the previous twelvemonth. The price of the shares has recently been dull and now stands at the lowest point touched during 1940. Reference to our price list will show that in this case, as in that of one or two others, the dividend for last year is left at its declared rate, but where the interim dividend in respect of the current twelve months has been passed, or deferred, no yield is stated opposite the price in our columns.

Victoria Falls Record

Victoria Falls and Transvaal Power shares have risen 2s. 6d. on publication of record earnings, the revenue for 1939 being more than 20 per cent. in excess of that in 1938. Most of the increase goes towards war taxation, a special sum of £300,000 being set aside for this purpose. The company's earnings exceeded the £2,000,000 mark for the first time. The dividend is maintained at 15 per cent. which, at the present price, gives a yield of a little over 5 per cent. on the money. The company's participating preference, which receive the usual 10 per cent., stand at 31s. Prices of shares in other overseas electricity supply companies show little change, though Calcutta Electrics have recovered 2s. to 25s. 6d., thanks to the demand which there is nowadays for dividends that are paid tax free. An uneasy suspicion prevails that income tax is not going to remain much longer at 7s. 6d. in the £. Whitehall preference have given way to 9s.

Equipment and Manufacturing Rises

Tube Investments stand out as one of the firmest features in the list of equipment and manufacturing shares, the price, at 72s. 6d., showing a rise of 8s. 9d. on the week. Walsall Conduits have recovered 3s. 9d. after their fall of 6s. 3d. last week. International Combustion at 4, J. Lucas ordinary at 42s. 6d. and Callenders at 50s. are ½ higher. Similar rises have taken British Insulated to 3½, Ever Ready to 20s. 6d., and Automatic Telephones to 35s. Vickers have been a lively and volatile market, the price rising to 14s. before going back to 13s. 6d., at which a small improvement is left on the week. Telephone Rentals improved to 6s. 3d. on the good report. Lancashire Dynamo, at 47s. 6d., are amongst the few shares that show a loss.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price July 9	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	42/6	15	15	42/6	...	7 1 2
British Power and Light	30/–	21/–	7	7	21/–	...	6 13 4
City of London	28/–	20/–	7½	7½	20/–	...	7 10 0
Clyde Valley	38/6	25/–	8	8	28/9	+⅛	5 11 4
County of London	43/3	22/–	10½	10½	25/–	+1/9	8 8 0
Edmundson's :							
7% Pref.	31/6	26/3	7	7	26/3	...	5 6 8
Ord.	27/6	18/6	9	6	20/6	+1/6	5 17 1
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6	...	5 10 9
Elec. Fin. and Securities	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	38/6	12	11½	38/9	...	5 18 7
Isle of Thanet	16/–	5/6	4	4	6/–	...	13 6 8
Lancs Light and Power	33/–	25/–	7½	7½	25/–	...	6 0 0
Llanelly Elec.	21/–	18/–	5½	5½	18/–	...	6 2 2
Lond. Assoc. Electric	21/–	12/6	7	5½	13/3	+3d.	—
London Electric	37/6	19/–	8	7	20/–	...	7 5 0
London Power Deb. Red.	105½	102	5	5	101½	...	4 18 6
Metropolitan	41/6	23/6	12	10	25/–	+⅛	8 0 0
Midland Counties	39/–	24/3	8	8	26/3	+⅛	6 2 0
Mid. Elec. Power	40/–	35/–	9	9	35/–	...	5 2 10
Newcastle Elec.	29/9	24/6	7	7	24/6	...	5 14 3
North Eastern Electric :							
Ordinary	31/6	17/6	7	7	19/6	...	7 3 7
7% Pref.	32/6	27/6	7	7	27/6	−⅛	5 1 10
Northampton	48/–	40/–	10	10	40/–	...	5 0 0
Notting Hill 6% Pref. (£10)	10¾	10	6	6	10	...	—
Northmet Power :							
Ordinary	42/3	23/–	10	10	25/–	+6d.	8 0 0
6% Pref.	29/–	23/–	6	6	26/–	+2/–	4 12 4
Richmond Elec.	24/6	18/–	7	6	20/–	...	6 0 0
Scottish Power	38/–	24/–	8	8	25/9	+9d.	6 4 3
Southern Areas	21/3	13/9	5	5	13/9	...	7 5 6
South London	23/3	20/–	7	7	20/–	...	7 0 0
West Devon	20/–	18/6	5	5	20/–	...	5 0 0
West Glos.	21/3	15/–	2½	4½	16/3	...	5 13 10
Yorkshire Elec.	40/–	24/6	8	8	27/6	+1/9	5 16 5
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/6	...	—
Calcutta Elec.	37/–	22/6	10*	8*	25/6	+2/–	6 8 0
Cawnpore Elec.	30/–	24/–	10	10	25/–	...	8 0 0
East African Power	25/6	21/–	7	7	21/3xd.	...	6 11 9
Jerusalem Elec.	24/–	18/–	7	7	20/–	...	7 0 0
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/6	...	6 10 5
Madras	26/9	25/–	8*	6*	25/–	...	4 16 0
Montreal Power	35½	30	1½	1½	32	...	—
Palestine Elec. "A"	25/–	17/–	5*	Nil	17/6	...	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	...	3 12 9
Shawinigan Power	27½	19	83cts.	90cts.	20½	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power	75/9	56/–	12½	15	58/9	+½	5 2 0
Whitehall Investments Pref.	17/9	10/–	7½	7½	9/–	−1/–	16 13 4
Public Boards							
Central Electricity :							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	106½	...	4 14 0
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	91½	...	3 16 6
London Elec. Trans Gtd.	92	87½	2½	2½	89	...	2 16 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	106	+1	4 5 0
B	116	103	5	5	104½	...	4 15 8
C	65½	25	1½	...	30	+4	—
West Midland Joint Elec.							
1948–68	106½	105	5	5	105½	...	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel. :							
Pref.	106	89	6	6	91½	−4	6 11 2
Def.	23½	21	1½	1½	21½	...	6 19 6
Anglo-Portuguese	22/6	16/–	8	8	16/3	...	9 17 0
Cable & Wireless :							
5½% Pref.	99¾	70	4½	5½	75½	+5½	7 17 2
Ord.	65	28½	4	4	37	+2	10 16 2
Income	99¾	93	...	...	96	+1	4 3 4
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/3	...	—
Globe Tel. & Tel. :							
Ord.	32/6	23/–	7½*	6*	25/–	−⅛	4 16 0
Pref.	22/9	22/6	6	6	23/9	...	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/–	18/6	10	7½	18/9	...	8 0 0
Oriental Telephone Ord.	2⅞	49/6	12*	11½*	2½	...	4 12 0
Telephone Props.	15/–	12/6	5	6	12/6	...	9 12 0
Telephone Rentals (5/–)	9/6	5/9	10	10	6/3	+6d.	8 0 0
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/–	...	—
4% Inc.	11½	2	Nil	Nil	3½	...	—
British Electric Traction							
Def. Ord.	830	440	5	45	500	+50	9 0 0
Pref. Ord.	169	144	8	8	145	...	5 10 3
Bristol Trams	48/6	1⅞	10	8*	37/6	...	—
Brazil Traction	12½	5½	$1	50c.	5½	...	—
Calcutta Trams	24/–	20/–	8	5½	20/–	...	5 10 0
Cape Elec. Trams	18/6	16/–	5	5	18/–	...	5 11 1
Lancs Transport	35/–	28/3	10	10	30/–	...	6 13 4
Mexican Light :							
1st Bonds	33	27	5	5	27½	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly. :							
5% Prefd.	79	35	5	5	47	+9	10 12 10
5% Pref.	104½	60	5	5	68½	+7	7 6 3
T. Tilling	45/9	31/–	10	10	31/3	...	6 8 0
Tilling & B.A.	47/6	43/9	9*	8*	47/6	...	3 7 10
West Riding	35/–	28/6	10	10	30/–	...	6 13 4
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	15/–	15	15	17/6	...	—
Assoc. Elec. :							
Ord.	43/3	27/–	10	10	31/3	+⅛	6 8 0
Pref.	35/3	32/3	8	8	33/9	...	4 14 10
Automatic Telephone & El.	47/3	32/–	12½	12½	35/–	+½	7 2 10
Babcock & Wilcox	50/–	28/6	10	11	32/6	...	6 15 4
British Aluminium Ord.	56/–	34/–	12½	12½	37/6	+1/9d.	5 13 4
British Insulated Ord.	92/6	67/–	20	20	70/–	+½	5 14 3
British Thermostat (5/–)	14/9	10/–	18½	18½	10/–	...	7 9 3
British Vacuum Cleaner(5/-)	12/6	8/–	40	12½	10/–	...	6 5 0
Brush Ord.	4/6	2/–	Nil	Nil	2/6	...	—
Callender's	69/–	46/–	15	15	50/–	+½	6 0 0
Chloride Elec. Storage	72/6	62/–	15	15	3½	...	4 16 0
Consolidated Signal	72/6	59/–	36½	17	71/3	...	4 15 4
Crabtree (10/–)	24/9	17/6	17½	17½	20/–	...	8 15 0
Crompton Parkinson :							
Ord. (5/–)	20/–	12/6	30	20	12/6	...	8 0 0
E. K. Cole (5/–)	5/–	2/6	10	Nil	2/9	...	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	5/3	...	—
Electric Construction	36/3	30/–	13½	10	30/–	...	6 13 4
Enfield Cable Ord.	56/–	40/6	25	16½	42/6	−⅛	7 13 0
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	...	5 0 0
English Electric	33/9	16/6	10	10	21/3	+⅛	9 8 2
Ensign Lamps (5/–)	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/–)	39/3	27/–	25*	25*	27/6	...	4 11 0
Ever Ready (5/–)	28/3	17/3	30	40	20/6	+½	9 15 2
Falk Stadelmann	18/3	14/–	10	6	15/–	...	8 0 0
Ferranti Pref.	25/–	23/–	7	7	25/–	...	5 12 0
G.E.C. :							
Pref.	32/6	27/–	6½	6½	27/6	...	4 14 6
Ord.	83/3	56/–	20	20	70/–	−10/–	5 14 3
Greenwood & Batley	25/6	21/3	15	13	20/–xd	...	6 10 0
Hall Telephone (10/–)	18/6	15/–	15	10	15/–	...	—
Henley's (5/–)	21/6	13/6	20	20	15/–	+⅛	6 13 4
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	35/–	12½	15	35/–	...	8 11 6
India-Rubber Pref.	21/–	20/–	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	75/–	32½	32½	4	+½	8 2 6
J. Lucas	60/6	40/–	15	15	42/6	+⅛	7 1 2
Johnson & Phillips	50/9	33/–	12½	15	33/9	...	8 18 0
Lancashire Dynamo	59/9	47/6	25	20	47/6	−½	8 8 5
Laurence Scott (5/–)	11/–	8/–	15	15	8/–	...	9 7 6
London Elec. Wire	25/6	24/6	12	7½	25/–	...	6 0 0
Mather & Platt	46/6	32/6	13½	10	32/6	...	6 3 1
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	63/9	+⅛	6 5 9
Pye Deferred (5/–)	9/–	6/9	25	25	7/–	−⅛	14 0 8
Revo (10/–)	20/9	12/6	17½	17½	12/6	−⅛	14 0 8
Reyrolle	60/6	42/6	12½	12½	43/9	−⅛	5 14 2
Siemens Ord.	23/9	16/3	7½	7½	16/3	...	9 4 8
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	...	10 0 0
S. Smith (1/–)	8/–	3/6	37½	50	3/9	...	13 6 8
Switchgear & Cowans (5/–)	11/9	7/6	20	10	7/6	−½	6 13 4
Telegraph Condenser (10/–)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction	42/6	32/6	10	10	32/6	...	6 3 1
Telephone Mfg. (5/–)	9/–	5/–	9	9	5/6	+6d.	8 3 8
Tube Investments	96/9	61/3	23¾	23¾	72/6	+⅞	6 12 0
Vactric (5/–)	3/6	2/–	4	Nil	2/6	...	—
Vickers (10/–)	22/–	9/6	10	10	13/6	+3d.	7 8 2
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	...	8 0 0
Westinghouse Brake	46/–	32/9	17½	10	35/–	...	5 14 3
Walsall Conduits (4/–)	26/6	17/6	55	55	21/3	+⅛	10 7 0
West, Allen (5/–)	7/–	4/6	10	7½	5/–	...	7 10 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia.—BRISBANE. — August 13th. City Electric Light Co. Two outdoor oil-immersed automatic step voltage regulators. (T. 19607/40.)*

SYDNEY.—October 24th. County Council. One 50,000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

Barnoldswick.—July 31st. Electricity Department. 6.6-kV switchboard and two 500-kVA transformers. (See this issue.)

Coventry.—July 12th. Electrical installations in 468 houses; city architect, 1a, Warwick Row, Coventry.

Denbigh.—July 16th. King Edward VII Welsh National Memorial Association. Rewiring block 4 at the North Wales Sanatorium, near Denbigh. Secretary, Cathays Park, Cardiff.

Fife.—July 16th. County Council. Various works, including electric lighting, at additions and alterations at police station, Kelty. G. Sandilands, county master of works, County Offices, Wemyssfield, Kirkcaldy (deposit £1 1s.).

Northampton. — July 17th. R.D.C. Wiring fifty houses on the Cottarville estate, Weston Favell. R. J. Miller, surveyor, Council Offices, 1, Spencer Parade (deposit £2 2s.).

Sleaford.—July 20th. Electricity Department. L.v. underground mains and overhead lines. (June 28th.)

South Africa.—JOHANNESBURG. — City Council. August 14th. 500 20-A, 2,000-V outdoor type isolating links. (T.20650/40.)*

August 1st. Union Tender and Supplies Board. One bank of nine low-voltage switches of the metal-clad, pedestal mounted, draw-out, triple pole, oil-break type. (T. 20655/40.)*

PRETORIA.—Union Tender and Supplies Board. August 8th. One bank of six l.v. switches of the air-insulated type for operation on a 380-220-V, three-phase, four-wire, 50-cycle system. (T. 20775/40.)*

August 1st. Public Works Department. Electrical apparatus comprising ceiling, desk and wall fans, kettles, radiators, reflectors and urns. (T. 20778/40.)*

August 8th. Two cold rooms in the Mental Hospital, the units to be of the air-cooled condenser type having capacities of 4,000 and 3,500 B.Th.U. per hour respectively. (T. 20774/40.)*

July 30th. City Council. Ten electric trolley-bus chassis, with double-deck bodies of the all-metal type capable of seating sixty passengers for the Bus Garage, Boom Street. Department of Overseas Trade (Room 75, 1st Floor).

CAPE TOWN.—September 5th. Electricity Department. Thirty-two 6-ft., eight 4-ft. and 56 2-ft. double-tier heaters for the wards of the Infectious Diseases Hospital. (T. 20785/40.)*

Warrington.—July 19th. Town Council. Two motor-driven vertical-spindle multi-stage combined borehole and force pumps, each set capable of raising 70,000 gal. per hour, one main Diesel engine - driven alternator and one auxiliary Diesel engine-driven generator, together with fuel-oil storage tank and ancillary apparatus. Binnie Deacon and Gourley, Artillery House, Artillery Row, London, S.W.1 (deposit £5).

Warwick.—July 16th. R.D.C. Submersible electric motor and centrifugal pump, capacity 6,000 gal. per hour, automatically controlled in conjunction with pressure tank, for the parish of Radford Semele water supply. Sholto Douglas, consulting engineer, 50, Priory Road, Kenilworth (deposit £3 3s.).

Orders Placed

Basingstoke. — Electricity Committee. Accepted. 900 yd. of cable for the Bramley extension (£283).—Hackbridge Cable Co. 11-kV ring main switchgear, with extra high voltage metering equipment (£614).— Ferguson, Pailin.

Birkenhead.—Health Committee. Accepted. Re-wiring Eastham House (£48). —S. George.

Bournemouth.—Pavilion Committee. Accepted. Concert hall lighting (£440).—Kennedys (Bournemouth), Ltd.

Cardiff.—Library Committee. Accepted. Electric lighting alterations at lending library (£29).—D. St. Leger.

Electricity Committee. Accepted. Section pillars (£107).—Siemens Bros. Three pumping sets (£1,698).—Harland Engineering Co. Pipes, &c., for cooling water scheme (£16,699).—Staveley Coal & Iron Co. Multicore cable (£106).—Edison Swan Cables. Busbar cables (£693).—Aberdare Cables.

Darwen.—Education Committee. Accepted. Overhaul of electric lighting at the Education Offices.—W. H. Crook.

(Continued overleaf)

Financial Section (*Concluded*)

Reports and Dividends—contd.

those years, from the corresponding sinking fund payments, which were to be made good over the remaining life of the outstanding stocks. Each cancellation of interest and each release from sinking fund obligations subsequent to those due for fulfilment by September 30th this year was to be subject to sanction by the representative committees, who, after consultation with the trustees, would have to satisfy themselves as to what course was possible under the then financial situation of the company.

As the representation at the meetings was not enough to constitute the required quorums, the meetings were adjourned until July 26th.

The Victoria Falls & Transvaal Power Co., Ltd., reports that, after providing for depreciation, amounts written off plant and equipment, income tax and renewals fund, and £300,000 for war taxation, there is a net profit for the year ended December 31st of £681,790, an increase of £29,755 as compared with 1938, to which is added £218,824 brought in, making £900,613. Reserve receives £200,000, and, as already announced, the final ordinary dividend is 11 per cent., maintaining the distribution for the year at 15 per cent. The balance carried forward is £273,047.

The report states that the sales during the year showed a satisfactory increase over those of the previous year, and the sales for the first six months of the current year show a further increase over those for the corresponding period of 1939. The last of the twelve sets for which the Klip power station is designed is about to come into service and work has proceeded on the site, and contracts for the principal items of plant have been placed for the Vaal station, designed for an installed capacity of 108,000 kW.

The Dubilier Condenser Co. (1925), Ltd., reports a trading profit for the year ended March 31st of £30,383, as compared with £4,742 in the preceding year, and a net profit of £24,052 (against a loss of £2,242). Taxation requires £10,000, and the ordinary dividend for the year is 10 per cent., the balance carried forward being £9,895, after crediting £6,905 brought in.

Christy Bros. & Co., Ltd., report a gross trading profit of £45,208 for the year to March 31st as compared with £53,843 for 1938-39, and a net balance of £19,368 (against £25,730), to which is added dividends on investments and fees, making a net revenue of £37,942 (£44,339). Income tax takes £6,339, loan interest £1,938, superannuation £1,000, N.D.C. £500, and general reserve £10,000. The ordinary dividend for the year is 10 per cent. (against 11 per cent.) and the balance carried forward is £23,043 (against £24,378 brought in).

Mirrlees, Bickerton & Day, Ltd., report a net profit for the year to March 31st of £25,595, as compared with £23,672 for the preceding year. Reserve receives £3,067, and the ordinary dividend for the year is maintained at 6 per cent. The balance carried forward is £8,288 (against £5,578 brought in).

Baird Television, Ltd.—Holders of 5 per cent. loan stock have approved the scheme of arrangement under which the company will be merged with Cinema Television, Ltd. The final date upon which the scheme can become operative has been postponed from June 30th to December 31st, 1940.

Berry's Electric, Ltd., reports a trading loss to March 31st of £845, as compared with a profit of £7,604 for 1938-39, and a net loss of £5,823, against £215. This is deducted from a balance of £13,518 brought in, and after providing for reserve leasehold premium and reserve redemption of rates, a balance of £1,266 is carried forward.

The Mexico Tramways Co. reports a net loss for 1939 of $549,984, Canadian currency, as compared with $421,387 for 1938. The debit carried forward is $9,270,437.

Telephone Rentals, Ltd., reports profits for the year to May 31st of £127,367, an increase of £5,806 as compared with the preceding year. The final dividend is 6 per cent., maintaining the distribution for the year at 10 per cent., £50,158 is provided for income-tax, reserve receives £30,000, and £39,648 is carried forward (against £44,675 brought in).

Thomas de la Rue & Co. announce that, owing to conditions arising out of the war, some delay in completing the accounts, which are normally presented about this time, will be inevitable this year.

The Telegraph Construction and Maintenance Co., Ltd., has declared an interim dividend of 5 per cent. This is at the same rate as for the previous year, but is paid on capital increased by a 5 per cent. scrip bonus and an issue of 62,250 £1 shares in March last.

Hall Telephone Accessories (1928), Ltd., has decided to defer consideration of a dividend until the accounts covering the full year are available. An interim dividend of 5 per cent. was paid last year, and was followed by a final distribution of 5 per cent.

Thos. Bolton & Sons, Ltd., in a preliminary statement, report a profit for the year to March 31st of £213,621, as compared with £128,724 for 1938-39. The final ordinary dividend is 7½ per cent., making 10 per cent., less tax, for the year (against 7½ per cent.).

Waygood-Otis, Ltd., has declared an interim dividend of 10 per cent. (against 12½ per cent.).

Bennis Combustion, Ltd., is paying a final dividend of 5 per cent., making 10 per cent. for the year (unchanged).

Crossley Bros., Ltd., have announced a first and final dividend of 5 per cent. (same).

Glasgow.—Housing Department. Accepted. Cables and fittings for three months.—W. Geipel; British Electrical & Manufacturing Co.

Huddersfield.—Electricity Department. Accepted. Six electric motors as standby at St. Andrew's works.—Brook Motors. Mains development scheme: 3,730 yd. of 0.3 in. cable.—Callender's; 3,000 yd. of 0.1 in. cable.—B.I. Cables.

Leeds.—Transport Committee. Accepted. Armature coils (£318).—Manchester Armature Repair Co.

Electricity Committee. Accepted. Conveyors for precipitator returns in connection with pulveriser house extension (£1,300).—International Combustion.

London.—HACKNEY.—Works Committee. Accepted. Traffic signals (£1,002).—Siemens and General Electric Railway Signal Co.

FINSBURY.—Borough Council. Recommended. Electric lighting for shelters (£671).—Berkeley Engg. Co. Fan units for shelters (£1,150).—Watkins & Watkins.

LEWISHAM.—Emergency Committee. Accepted. Switchboard and battery chargers for trench emergency lighting (£117).—Crypton Equipment.

WANDSWORTH.—Borough Council. Accepted. Electric lighting in shelters (£204).—F. Angell & Co.

Newark-on-Trent.—Town Council. Recommended. 11-kV ring main switchgear (£220), and 50-kVA transformer (£73).—Brush Electrical Engineering Co.

Portsmouth.—Electricity Committee. Accepted. Two 850-kVA transformers (£413 each).—Hackbridge Electric Construction Co. Earthing resistance (£259).—Rheostatic Co.

South Shields.—Town Council. Accepted. Repairs to battery at the electricity works (£1,222).—Tudor Accumulator Co.

Warrington.—Gas Department. Accepted. Electrically operated automatically controlled boosting plant.—Bryan & Donkin.

Watford.—Electricity Committee. Accepted. Switchgear for substation (£593), and for railway premises (£577).—G.E.C.

West Ham.—Electricity Committee. Accepted. Transformers (£1,678).—Electric Construction Co. Switch units (£149).—Ferguson, Pailin, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashton-under-Lyne.—Shelters (48 persons each); borough engineer.

Barking.—Works additions, Harts Lane; Thames Plywood Manufacturers, Ltd.

Basingstoke.—Garage, &c., Station Hill; Gerrish, Ames & Simpkins, Ltd.

Beeston & Stapleford.—Communal shelters (£3,591), for U.D.C.; surveyor, Public Offices, Foster Avenue, Beeston.

Birkenhead.—Tenements (£20,660); borough engineer.

Cambridgeshire.—Buildings at Westfield Farm, Comberton, for C.C.; County Agricultural Officer, Shirehall, Cambridge.

Carlisle.—Completion of three housing estates (£77,300); city engineer.

Castleford.—Twelve public shelters; U.D.C. surveyor.

Cheltenham.—Technical college, The Woodlands; borough engineer.

Cheshunt.—Communal shelters, for U.D.C.; A. Burton Stibbon, surveyor, Manor House, Cheshunt, Waltham Cross.

Consett (Co. DURHAM).—Public shelters; T. P. Leath, U.D. Offices, Consett.

Coventry.—Works extensions for A. Herbert, Ltd., Canal Road.

Crewe.—Houses (£65,748), for T.C.; borough engineer, Municipal Offices.

Doncaster.—Pumping stations at Thorne, for River Trent Catchment Board; W. H. Haile, engineer to the Board, Derby Road, Nottingham.

Durham.—School and public shelters; R.D.C. surveyor, Byland Lodge, Durham.

Eccles.—Church, Peel Green; Parochial Church Council.

Essex.—School shelters (£80,000); county architect, Shire Hall, Chelmsford.

Gateshead-on-Tyne.—Canteen on the Team Valley Trading Estate; H. E. Pitt, Ltd., Leopold Street, Millfield, Sunderland.

Haverfordwest.—Building for decontamination centre; borough engineer.

Huntingdon.—Houses at Alconbury, Ellington, Molesworth, and Bythorn, for R.D.C.; surveyor, Council Offices.

Ilkeston.—Works additions, Crompton Road; Stanton Ironworks Co., Ltd.

Keighley.—Houses, Oak Bank Grove, for Albert Sharp, Ltd., Slaymaker Lane, Oakworth, Keighley.

Kettering.—Additional accommodation at omnibus garage and station, Northampton Road, for the United Counties Omnibus Co., Ltd., Houghton Road, Northampton.

Kidderminster.—Offices, Lark Hill; Humphries & Bowdler.

Leamington Spa.—Nurses' home for Royal Midland Counties Home for Incurables.

Leeds.—Works additions, Bolton Road; Union Lead Works, Ltd.

School, Seacroft; Education Committee.

Lichfield.—Houses (24), Ponesfield estate; city engineer.

Factory extensions; John Harris (Coventry), Ltd.

Liverpool.—Buildings for S. Banner & Co., Ltd., 34, Castle Street; Tyson's (Contractors), Ltd., Dryden Street, Liverpool, 5.

Extensions to works for dining room and offices, Cheapside, for Peerless Refinery Co. (Liverpool), Ltd.; Campbell, Honeybourne & Sumner, architects, School Lane.

Parish hall, Stapleton Avenue, Speke, for Rev. E. McCarthy; E. Prestwich, architect, Bradshawgate, Leigh.

School, Pilch Lane, for Independent Baptist Church trustees; A. Ernest Shennan, architect, North House, 17, North John Street, Liverpool.

London.—BERMONDSEY.—Factory, 175-176, Grange Road; W. Figg, George Row, S.E.16.

HAMMERSMITH.—A.R.P. building (£1,860); borough engineer, Town Hall, W.6.

WOOLWICH.—Additional public shelters (£1,814); borough engineer, Town Hall, S.E.18.

Morecambe.—Additional air-raid shelters (£13,380); R. B. Savage, borough engineer, Town Hall.

Motherwell and Wishaw.—Shelters to accommodate 48 persons each (£73,000); burgh surveyor.

Newcastle-on-Tyne.—First-aid, &c., station, for City Council (£2,500); Kirk & Dickinson, builders, 182, New Bridge Street, Newcastle.

Northampton.—Reconstruction of works, Commercial Street and Weston Street, for Cooch & Sons; F. H. Allen, architect, 24, Albion Place.

Northumberland.—Shelters at scsools: John Urpeth, Gibsons Buildings, Front Street, Bedlington; and Gibson Bros., Hill Heads, Whitley Bay.

Oxford.—Engineering block at municipal college, Cowley Road, for E.C.; city engineer.

Pembrokeshire.—Shelters at Milford Haven, Pembroke and Neyland, for C.C.; county architect, Council Offices, Haverfordwest.

Plymouth.—Communal shelter, Prince of Wales' Hospital; borough engineer.

Portsmouth.—Alterations and additions, Brass Foundry, Nobbs Lane; R. Wood & Son.

Works additions, London Road, Hilsea; Reading & Co.

Sheffield.—Conversion of laundry at the City of Sheffield Children's Homes (£2,650); W. George Davies, city architect.

Workshop extensions, Bacon Lane, for the Special Steel Co., Ltd.

Shropshire.—Schools, Albrighton and Donnington Wood; A. Guy Chant, county architect, 5, Belmont, Shrewsbury.

Staffordshire.—Junior school, Pheasey Estate, Great Barr; K. L. Murray, county architect, County Buildings, Stafford.

Staines.—Factory extension, Littleton Lane, Laleham; Spun Concrete, Ltd.

Additions, Blandford House, Kingston Road; Staines Co-operative Society, Ltd.

Stalybridge.—Nine shelters, Union Street, George Street, &c.; town clerk, Stamford Street.

Stockton-on-Tees.—Public shelters in 12 areas; R.D.C. surveyor, 19, Finkle Street, Stockton.

Public shelters for 1,088 people; borough engineer.

Sunderland.—Garage, Coronation Street, for Fenwick & Co., Ltd.; Gordon Durham & Co., builders, East Boldon.

Tendring.—Pumping station, for R.D.C.; Surveyor's Department, Weeley House, Weeley.

Tottenham.—Factory extensions, Broad Lane; D. Gestetner, Ltd.

Works extensions, Farningham Road; Radiamp Co., Ltd.

Wakefield.—Works additions, Calder Vale Road; Brotherton & Co., Ltd.

Watford.—Crematorium, Heath Farm; Watford Crematorium, Ltd.

Maternity centre; borough engineer.

Wellington (SHROPSHIRE).—Houses at Ellerdine and Edgmond, for the R.D.C.; James Hickman & Son, architects, Wellington.

Welshpool.—Slaughterhouse scheme (£4,100); borough surveyor, Severn Street.

Workington.—Offices, &c., Siddick Rd.; Thermal Syndicate, Ltd.

Houses (96), Salterbeck estate; borough engineer.

Worksop.—Eleven shelters (50 persons each), Hodsock and Harworth, for R.D.C.; surveyor, Council Offices, Carlton Road.

York.—Extensions, Naburn Hospital; city engineer.

Six shelters, Bishopthorpe, Sherburn-in-Elmet, and Micklefield; county architect, County Hall, Wakefield.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from July 3rd.

Gefsol. No. 611055. Class 9 (IV). Electric accumulators, batteries, cells, connections, contacts and terminals; bells, buzzers, rectifiers, conductors, blowers, resistances and transformers; cut-outs, meters, welding apparatus, measuring devices, coils and coil holders, conduit material, vacuum cleaners, switches, switchboards, distribution boards and boxes, relays and electric leak indicators, &c.—Geo. Forrest & Son, Ltd., 31, St. Bride Street, London, E.C.4.

Cycloc (lettering and design). No. 611643. Class 9 (IV). Radio apparatus and parts thereof, radiograms, electrical sound amplifiers, electric public address apparatus, current rectifiers, stabilisers and transformers, and battery chargers.—Harmer and Simmons, Ltd., 1-3, Arkley Road, Walthamstow, E.17.

War Ideas

PROFESSIONAL people who feel they are not doing suitable war work are invited to communicate with "Civil Liaison," 86, Hamilton Terrace, N.W.8. This body has a technical section that works in conjunction with the existing Research Co-ordination Committee, of which Mr. L. E. C. Hughes is hon. secretary. The chairman is Mr. A. B. Cox ("Francis Iles"), who is supported by Mr. A. S. E. Ackermann. Technicians are asked to submit for consideration useful ideas with which Government Departments have been unable to deal, which, if considered suitable, can be developed and re-submitted to appropriate quarters.